



COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY

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MEMORANDUM

TO: State Water Control Board Members

FROM: Jutta Schneider, Water Planning Division Director *Jutta Schneider*

SUBJECT: Adoption of Water Quality Standards Regulation Amendments (9 VAC 25-260) – “Follow-on” Rulemaking to Triennial Review

DATE: May 10, 2018

EXECUTIVE SUMMARY

Staff will ask the Board to adopt proposed amendments to the Virginia Water Quality Standards Regulation (9 VAC 25-260). Based upon review of public comment and final EPA recommendations and technical support information, staff has concluded the following actions are appropriate:

- Adopt proposed amendments to the bacteria criteria, which keep the Geometric Mean (GM) values for both freshwater and marine water unchanged; slightly increase the Statistical Threshold Value (STV) for both freshwater and marine water; revise the assessment period for both the GM and STV to consider all data collected in up to a 90 day period; and, include provisions covering bacterial limits and monitoring periods in VPDES permits.
- Adopt proposed amendments to the cadmium criteria, which are slightly more stringent than the current acute and chronic values for both freshwater and marine water.
- Adopt proposed amendments to 94 human health parameters, which reflect the latest scientific information and EPA policies, including updated factors for exposure, bioaccumulation, and toxicity.
- Further defer action on amendments to the ammonia criteria, in consideration of recent changes made to Virginia State Code.

BACKGROUND

The water quality standards are the cornerstone for water quality protection and restoration programs at the Department of Environmental Quality. For example, these standards are used to set pollution limits in discharge permits and evaluate the quality of surface waters statewide. Water quality standards define the goals for healthy waters by designating their uses, setting water quality conditions that will protect those uses and establishing anti-degradation provisions to safeguard high quality waters. They protect water quality so rivers, lakes and other waterbodies can be sources of water supplies; support recreational, agricultural, and industrial activities, among others; promote the growth

of fish and shellfish that are suitable for human consumption; and protect aquatic life and water-dependent wildlife.

Both the Clean Water Act and State Water Control Law require that the Board review Virginia’s water quality standards every three years for the purposes of revising and updating to reflect changes in law, technology and scientific information. The goal is to provide the citizens of the Commonwealth with a technical regulation that is protective of water quality in surface waters, incorporates recent scientific information, reflects agency procedures and is reasonable and practical. The Board concluded a portion of the most recent Triennial Review (TR) at its meeting on January 14, 2016, adopting several non-controversial amendments to the Water Quality Standards Regulation. Those amendments were approved by EPA in letters dated June 5, 2017, and December 22, 2017, and are now in effect.

PURPOSE

At their January 2016 meeting the Board approved recommendations to separate four elements of the TR and address these in a “follow-up” continuation of the rulemaking, to allow more public review and input on the proposals and consideration of additional information and technical guidance from EPA. The Board also directed the staff to continue use of the participatory approach for the “follow-on” rulemaking and reconvene the Regulatory Advisory Panel (RAP) formed for Triennial Review. The RAP met five times from March 2016 to February 2018; the RAP membership is provided as **Attachment 1**.

Three of the separated elements were amendments to the bacteria criteria, the cadmium criteria, and 94 human health parameters. For each element, staff will provide background on the proposed amendments, review the results of two public hearings (Oct. 24, 2017 in Richmond and Nov. 28, 2018 in Roanoke) and a 60-day public comment period, the staff response to comments, along with consideration of final EPA recommendations for criteria revisions and technical support information.

The fourth element separated from TR, amendments to the ammonia criteria, is being recommended for further deferral due to recent legislation adopted by the 2018 General Assembly. Virginia Code now requires that ammonia criteria amendments cannot be adopted unless the Board includes in such adoption a phased implementation program that addresses the potential adverse impact on permitted dischargers across the State. DEQ staff intends to develop this phased implementation program and return to the Board with recommendations for approval before the end of this year.

A. BACTERIA CRITERIA

1. Background and Proposed Amendments

In 2012, the Environmental Protection Agency (EPA) published nationally recommended Recreational Water Quality Criteria (RWQC) for assessing potential risks to humans posed by bacteria in surface waters. The RWQC reflected the latest scientific knowledge, public comments, and external peer review and are designed to protect the public from exposure to harmful levels of pathogens while participating in water-contact activities such as swimming, wading, and surfing in waters designated for such recreational uses. It is important to note that all of Virginia’s surface waters are currently designated for primary contact recreation. The RWQC are similar to Virginia’s current bacteria criteria, but provide additional refinements and options to the states. In 2017, EPA conducted a mandatory 5-year review of the RWQC and decided to keep the 2012 criteria unchanged during this review cycle.

EPA’s recommended RWQC offers two sets of numeric concentration thresholds, both of which are protective of the primary contact recreation use, but use different estimated illness rates based on the National Epidemiological and Environmental Assessment of Recreational Water (NEEAR) definition of gastrointestinal illness. States can choose to use either an estimated illness rate of 36 or 32 per 1,000 population. Since Virginia’s existing bacteria criteria are based on the 36/1,000 rate, and subsequently all existing impaired waters designations, TMDLs and restoration implementation plans are based on this rate, for consistency the recommended criteria continue the use of this factor.

The RWQC consist of three components: magnitude, frequency and duration. The magnitude of the bacterial indicators are now expressed as both a geometric mean (GM) and a statistical threshold value (STV) for the bacteria samples. The GM is a type of average value (mathematically defined as the n th root of the product of n numbers), and approximates the 50th percentile of the water quality data distribution used by EPA in forming the recommended RWQC. The STV approximates the 90th percentile of the water quality distribution. In terms of frequency, the GM is a “not-to-be-exceeded” value and the STV is intended to be a value that should not be exceeded in more than 10% of the samples taken.

EPA originally recommended that the duration applicable to the RWQC was a 30-day interval for both the GM and STV. This was problematic to DEQ and the Regulatory Advisory Panel formed to assist with the rulemaking, because the majority of Virginia’s waters are only monitored once per month, and this single sample would have to be used as both the GM and the STV, potentially leading to an increase in “false” impairment designations without any real improvements in human health protection. However, in October 2015 a narrative justification for a longer duration for the RWQC was issued, clarifying that EPA considers a period of up to 90 days to represent an acceptable critical exposure period to protect recreational uses. This duration is part of the proposal being presented for the Board’s consideration.

The following tables compare the current bacteria criteria and the proposed revisions:

Table 1. CURRENT WQ CRITERIA FOR BACTERIA

Criteria Element	E. Coli (counts/100ml) Freshwater	Enterococci (counts/100 ml) Saltwater and Transition Zones
Geometric Mean	126	35
Single Sample Maximum	235	104

GM criterion can be waived when there are not enough samples to calculate (minimum 4 samples in a calendar month). Allowable exceedence rate (not greater than 10%) of SSM calculated over a six-year period using all observations.

Table 2. PROPOSED WQ CRITERIA FOR BACTERIA

Criteria Element	E. Coli (counts/100ml) Freshwater	Enterococci (counts/100 ml) Saltwater and Transition Zones
Geometric Mean	126	35
Statistical Threshold Value	410	130

GM and STV must both be assessed, using all observations over a period up to 90 days.

2. Public Comment and DEQ Response

During the 60-day public comment period, which closed December 18, 2017, the following comments were received on the proposed Bacteria criteria amendments:

- The Chesapeake Bay Foundation expressed support for the proposed revisions.
- EPA commented that DEQ should ensure the proposal is consistent with recommendations regarding duration and frequency of exceedance.

DEQ's Response:

- *Acknowledge CBF's support for the proposed revisions.*
- *To be consistent with EPA's RWQC recommendations, the updated bacteria standard has been revised to specify a 90-day duration for assessment of both the geometric mean and the statistical threshold value (STV), with the STV not having a greater than 10% excursion frequency.*

DEQ reconvened the Regulatory Advisory Panel for the rulemaking on February 21, 2018, to discuss further revisions to the bacteria criteria proposal which were not considered significant, but the agency sought concurrence before proceeding with final recommendations.

- First, it was originally proposed to strike the section covering secondary contact recreation criteria since EPA's RWQC recommendations did not provide any criteria for this classification. Upon further consideration, DEQ decided to retain this section in the event that EPA does provide recommendations in the future.
- Second, language had been added to cover the type and frequency of bacterial effluent monitoring at permitted discharges requiring disinfection. Both the GM and STV were to be measured, retaining the existing 30-day assessment period, with specified minimums for the number of samples to be taken.

The first item was agreed to by the RAP; however, additional comments were received on the second item from the Virginia Association of Municipal Wastewater Agencies:

- Permitting procedures should not be addressed in the Water Quality Standards Regulation; the better approach is to use the Permit Manual or Guidance.
- It is unnecessary to include a specific STV-based limit in VPDES permits.

DEQ's Response:

- *It is not unusual for the Water Quality Standards Regulation to include policy elements related to permitting. For example, 9 VAC 25-260-20 (General Criteria) deals with the use of mixing zone concepts in evaluating VPDES permit limits. DEQ's Water Permit staff has advised that we should establish in the regulation that VPDES compliance with the geometric means of 126 counts/100ml for E.coli or 35 counts/100ml for enterococci will be determined with monthly geometric means. This has been our historical approach and it is appropriate to specify this in regulation now that instream assessment periods up to 90 days may be used. Regarding use of the STV, staff agrees that implementation can be addressed in permit guidance rather than in the Regulation and this provision has been removed from the proposal.*

B. CADMIUM CRITERIA

1. Background and Proposed Amendments

Virginia's current freshwater cadmium criteria are based on EPA guidance issued in 1984. EPA updated their nationally recommended cadmium criteria in 2001, using “dissolved” instead of “total

recoverable” cadmium to more accurately account for bioavailability and reflect the latest EPA policy for metals risk assessment to aquatic life. Virginia did not immediately act to adopt the revised criteria for freshwater at that time because it was known that EPA was conducting further study and supplemental revisions to the criteria were expected. Additional changes were proposed, in part based on a report published by the U.S Geological Survey in 2010, and DEQ staff was preparing to present these recommended changes to the Board for approval as part of the Triennial Review rulemaking at their January 2016 meeting.

However, in November 2015, EPA gave notification of a pending update to their nationally recommended freshwater cadmium criteria, reflecting the latest scientific information. To avoid confusion and potential for adoption of freshwater aquatic life criteria more restrictive than the pending federal recommendations without justification, staff recommended that the Board withdraw the proposed amendments and address cadmium as part of the “follow-on” rulemaking.

EPA’s nationally recommended 2016 criteria reflect toxicity data for 75 new species and 49 new genera. As in the 2001 criteria, the 2016 freshwater acute criterion was derived to be protective of aquatic species and was lowered further to protect the commercially and recreationally important rainbow trout. In addition, the duration of the 2016 acute criterion was changed to one-hour. Both changes are consistent with EPA’s current aquatic life criteria guidelines. Modest changes to the saltwater acute and chronic criteria are due to inclusion of additional sensitive genera in the toxicity database used to derive the values.

The following tables compare the current Cadmium criteria and the proposed revisions:

Table 3. WQ CRITERIA FOR CADMIUM IN FRESHWATER – Current & Proposed

Criterion	Acute (ug/L; hardness = 100)	Chronic (ug/L; hardness = 100)
Virginia (1984)	3.9	1.1
EPA (2001)	2.0	0.25
<i>EPA (2016)</i>	<i>1.8</i>	<i>0.72</i>

Table 4. WQ CRITERIA FOR CADMIUM IN SALTWATER – Current & Proposed

Criterion	Acute	Chronic
Virginia (2001)	40	8.8
<i>EPA (2016)</i>	<i>33</i>	<i>7.9</i>

Note that while three of the four criteria are slightly more stringent than EPA’s 2001 recommendations, the freshwater chronic value is less stringent –however, all the recommended revisions are more stringent than Virginia’s current cadmium criteria.

2. Public Comment and DEQ Response

No comments were received regarding amendments to the cadmium criteria during the 60-day public comment period, which closed December 18, 2017.

C. HUMAN HEALTH CRITERIA (94)

1. Background and Proposed Amendments

Under the original Triennial Review rulemaking, DEQ staff was working on amendments to eight human health parameters in the Water Quality Standards Regulation that are potentially toxic or carcinogenic. However, in June 2015 EPA issued recommended updates for 94 human health parameters (including the eight already under consideration) on the same day that the Virginia Register published public notice for the Triennial Review’s proposed amendments. Due to the lack of opportunity for sufficient public comment on potential changes to the original eight parameters, DEQ recommended that the Board withdraw the proposed amendments and address all 94 updated human health parameters as part of the “follow-on” rulemaking.

EPA’s recommended criteria updates included recent research into exposure factors (body weight, drinking water consumption rates, fish consumption rate, and relative source contribution), bioaccumulation factors, and toxicity factors (reference dose, cancer slope factor). Each human health parameter has two criteria (one for Public Water Supply and one for all other waters) for a total of 188 individual criteria concentrations:

- 127 of these would become more stringent
- 57 would become less stringent
- 2 remain unchanged
- 2 are new additions; did not have criteria in the current Regulation

See **Attachment 2**, which compares previous water quality criteria with the updated values for all 94 parameters.

2. Public Comment and DEQ Response

- EPA requested that DEQ consider adopting EPA’s 2015 updated criteria for 2,4,5-Trichlorophenoxy propionic acid (Silvex).

DEQ’s Response:

- *The omission of the updated criteria for Silvex from the regulatory proposal was an oversight that will be corrected prior to final adoption by the Board. This parameter is accounted for in the total count (94) of pollutant criteria being amended.*
- Several commenters (American Forest & Paper Association, Hampton Roads Sanitation District, National Council for Air and Stream Improvement, Inc., Virginia Manufacturers Association/Troutman Sanders LLP, West Rock, Virginia Coal and Energy Alliance, Inc.) expressed the opinion that there are substantial weaknesses with the assumptions (e.g., fish consumption rate, drinking water consumption rate, and relative source contribution factors) EPA used to derive the nationally recommended criteria. These commenters recommend that DEQ use alternative assumptions that are less conservative. Additionally, commenters recommended DEQ produce an estimate of potential costs.

DEQ’s Response:

- *EPA’s updated criteria recommendations are based on science and policy that were vetted through a very extensive public process, including both external expert peer and stakeholder review. Because EPA proposed these updated criteria to the public and requested comments, it is EPA’s view that these criteria have undergone review on a national level and no additional facts were presented during the review and comment periods that indicated to EPA any other alternate estimates for different exposure assumptions would be appropriate for these chemicals. DEQ lacks the staff and*

resources to mobilize a multi-year process, similar to that employed by EPA, to develop scientifically defensible alternative assumptions – which could result in being more or less conservative. The agency generally assumes that nationally recommended section 304(a) criteria are reasonably sound and scientifically defensible.

Although DEQ has not estimated the potential costs to dischargers that would be caused by the updated criteria, DEQ does not believe that costs will be substantial statewide since the majority of the affected pollutants are uncommon and discharger-specific. EPA’s Water Quality Standards Regulation (40 C.F.R. §131) provides States with multiple relief options when the costs of complying with water quality standards are proven to be too burdensome. These options can be considered once the criteria are adopted and discharger/waterbody-specific costs are better understood. It is notable that 57 of the criteria would become less stringent which may result in cost savings for some facilities, if any of these parameters are regulated in their discharge.

Attachment 3 presents the VA Department of Planning and Budget’s Economic Impact Analysis, including potential impacts due to the human health parameter amendments.

ATTORNEY GENERAL’S CERTIFICATION

The Office of the Attorney General has been asked to review the proposed amendments and certify the Board’s authority to adopt them. If certification is received before the Board meeting, this will be reported.

STAFF RECOMMENDATIONS – Staff recommends the Board:

1. Adopt the proposed amendments to the bacteria criteria for recreational waters, 9 VAC 25-260-170, as presented.
2. Adopt the proposed amendments to the cadmium criteria for surface waters, 9 VAC 25-260-140, as presented.
3. Adopt the proposed criteria amendments for 94 human health parameters in surface waters, 9 VAC 25-260-140, as presented.
4. Defer action on the proposed amendments to 9 VAC 25-260-155, Ammonia Surface Water Quality Criteria, in consideration of Chapters 510 (HB 1475) and 511 (SB344) of the 2018 Acts of Assembly.

PRESENTER CONTACT INFORMATION:

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ATTACHMENTS

Attachment 1: Regulatory Advisory Panel Membership

Attachment 2: Comparison of EPA’s 2015 Final Updated HH AWQC and Previous HH AWQC (6/15)

Attachment 3: Department of Planning and Budget’s Economic Impact Statement (6/16/17)

Attachment 4: Final Regulation Agency Background Document

Attachment 5: Virginia Water Quality Standards (9 VAC 25-260), full text of “Follow-on” Rulemaking Proposed Amendments

Attachment 1

Regulatory Advisory Panel Membership ("Follow-on" Rulemaking to Triennial Review)

Organization	Contact #1	Contact #2
Water Environment Federation	Chris French	
Chesapeake Bay Foundation	Joe Wood, CBF-VA Staff Scientist	Rebecca LePrell, CBF-VA Exec. Dir.
City of Richmond	Robert Steidel, DPU Director	Grace LeRose, TMDL Coordinator
Dominion Power	Oula Shehab-Dandan	
EPA Region 3	Cheryl Atkinson, EPA Region 3 Water Protection Division/Office of Watersheds	
Friends of the Rivers of Virginia	Patti Jackson	Bill Tanger
James River Association	Jamie Brunkow, JRA-Lower James Riverkeeper	Bill Street, JRA- Executive Director
U.S. Fish and Wildlife Service	Susan Lingenfelter, VA Field Office	Serena Ciparis, VA.Tech (USFWS Proxy)
VA Association of Municipal Wastewater Agencies (VAMWA)	Ted Henefin, VAMWA President	Jamie Heisig-Mitchell
VA Chamber of Commerce Natural Resources Committee	Clayton Walton (alternate for Dennis Tracy)	
Virginia Coal Association (now VA Coal & Energy Alliance)	John Paul Jones, Alpha Natural Resources Services, LLC	
VA Dept. of Conservation and Recreation	Thomas Smith, DCR-Natural Heritage Div. Dir.	Rene Hypes, DCR- Natural Heritage Program
VA Department of Health (VDH)	Margaret Smigo, Waterborne Hazards Control Manager	Dwight Flammia, State Public Health Toxicologist
VA Department of Game and Inland Fisheries (DGIF)	Ray Fernald, DGIF-Env. Services Manager	Ernie Aschenbach, Env. Services Biologist
VA Manufacturers Association (VMA) and VA Mining Issues Group	Andrew Parker, Honeywell-Hopewell	Brooks Smith, Troutman Sanders

Invited, but did not participate: U.S. Navy – Naval Facilities Engr. Command; Virginia Save our Streams; Hampton Roads Planning District Commission; The Nature Conservancy, VA Chamber of Commerce Natural Resources Committee; VA Farm Bureau Federation; VA Institute of Marine Science

Attachment 2

**Comparison of EPA's 2015 Final Updated Human Health AWQC and Previous AWQC
June 2015**

Pollutant	CAS No.	2015 EPA Human Health AWQC for the Consumption of		Previous EPA Human Health AWQC for the Consumption of	
		Water + Organism (ug/L)	Organism Only (ug/L)	Water + Organism (ug/L)	Organism Only (ug/L)
1,1,1-Trichloroethane	71-55-6	10,000	200,000	*	---
1,1,2,2-Tetrachloroethane	79-34-5	0.2	3	0.17	4
1,1,2-Trichloroethane	79-00-5	0.55	8.9	0.59	16
1,1-Dichloroethylene	75-35-4	300	20,000	330	7,100
1,2,4,5-Tetrachlorobenzene	95-94-3	0.03	0.03	0.97	1.1
1,2,4-Trichlorobenzene	120-82-1	0.071	0.076	35	70
1,2-Dichlorobenzene	95-50-1	1,000	3,000	420	1,300
1,2-Dichloroethane	107-06-2	9.9	650	0.38	37
1,2-Dichloropropane	78-87-5	0.90	31	0.5	15
1,2-Diphenylhydrazine	122-66-7	0.03	0.2	0.036	0.2
1,3-Dichlorobenzene	541-73-1	7	10	320	960
1,3-Dichloropropene	542-75-6	0.27	12	0.34	21
1,4-Dichlorobenzene	106-46-7	300	900	63	190
2,4,5-Trichlorophenol	95-95-4	300	600	1,800	3,600
2,4,6-Trichlorophenol	88-06-2	1.5	2.8	1.4	2.4
2,4-Dichlorophenol	120-83-2	10	60	77	290
2,4-Dimethylphenol	105-67-9	100	3,000	380	850
2,4-Dinitrophenol	51-28-5	10	300	69	5,300
2,4-Dinitrotoluene	121-14-2	0.049	1.7	0.11	3.4
2-Chloronaphthalene	91-58-7	800	1,000	1,000	1,600
2-Chlorophenol	95-57-8	30	800	81	150
2-Methyl-4,6-Dinitrophenol	534-52-1	2	30	13	280
3,3'-Dichlorobenzidine	91-94-1	0.049	0.15	0.021	0.028
3-Methyl-4-Chlorophenol	59-50-7	500	2,000	*	*
Acenaphthene	83-32-9	70	90	670	990
Acrolein	107-02-8	3	400	6	9

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		Water + Organism (ug/L)	Organism Only (ug/L)	Water + Organism (ug/L)	Organism Only (ug/L)
Acrylonitrile	107-13-1	0.061	7.0	0.051	0.25
Aldrin	309-00-2	0.00000077	0.00000077	0.000049	0.00005
alpha-Hexachlorocyclohexane (HCH)	319-84-6	0.00036	0.00039	0.0026	0.0049
alpha-Endosulfan	959-98-8	20	30	62	89
Anthracene	120-12-7	300	400	8,300	40,000
Benzene	71-43-2	0.58 - 2.1	16 - 58	0.61 - 2.2	14 - 51
Benzidine	92-87-5	0.00014	0.011	0.000086	0.0002
Benzo(a)anthracene	56-55-3	0.0012	0.0013	0.0038	0.018
Benzo(a)pyrene	50-32-8	0.00012	0.00013	0.0038	0.018
Benzo(b)fluoranthene	205-99-2	0.0012	0.0013	0.0038	0.018
Benzo(k)fluoranthene	207-08-9	0.012	0.013	0.0038	0.018
beta-Hexachlorocyclohexane (HCH)	319-85-7	0.0080	0.014	0.0091	0.017
beta-Endosulfan	33213-65-9	20	40	62	89
Bis(2-Chloro-1-Methylethyl) Ether	108-60-1	200	4,000	1,400	65,000
Bis(2-Chloroethyl) Ether	111-44-4	0.030	2.2	0.03	0.53
Bis(2-Ethylhexyl) Phthalate	117-81-7	0.32	0.37	1.2	2.2
Bis(Chloromethyl) Ether	542-88-1	0.00015	0.017	0.0001	0.00029
Bromoform	75-25-2	7.0	120	4.3	140
Butylbenzyl Phthalate	85-68-7	0.10	0.10	1,500	1,900
Carbon Tetrachloride	56-23-5	0.4	5	0.223	1.6
Chlordane	57-74-9	0.00031	0.00032	0.0008	0.00081
Chlorobenzene	108-90-7	100	800	130	1,600
Chlorodibromomethane	124-48-1	0.80	21	0.4	13
Chloroform	67-66-3	60	2,000	5.7	470
Chlorophenoxy Herbicide (2,4-D)	94-75-7	1,300	12,000	100	---
Chlorophenoxy Herbicide (2,4,5-TP) [Silvex]	93-72-1	100	400	10	---

**Comparison of EPA's 2015 Final Updated Human Health AWQC and Previous AWQC
June 2015**

Pollutant	CAS No.	2015 EPA Human Health AWQC for the Consumption of		Previous EPA Human Health AWQC for the Consumption of	
		Water + Organism (ug/L)	Organism Only (ug/L)	Water + Organism (ug/L)	Organism Only (ug/L)
Chrysene	218-01-9	0.12	0.13	0.0038	0.018
Cyanide	57-12-5	4	400	140	140
Dibenzo(a,h)anthracene	53-70-3	0.00012	0.00013	0.0038	0.018
Dichlorobromomethane	75-27-4	0.95	27	0.55	17
Dieldrin	60-57-1	0.0000012	0.0000012	0.000052	0.000054
Diethyl Phthalate	84-66-2	600	600	17,000	44,000
Dimethyl Phthalate	131-11-3	2,000	2,000	270,000	1,100,000
Di-n-Butyl Phthalate	84-74-2	20	30	2,000	4,500
Dinitrophenols	25550-58-7	10	1,000	69	5,300
Endosulfan Sulfate	1031-07-8	20	40	62	89
Endrin	72-20-8	0.03	0.03	0.059	0.06
Endrin Aldehyde	7421-93-4	1	1	0.29	0.3
Ethylbenzene	100-41-4	68	130	530	2,100
Fluoranthene	206-44-0	20	20	130	140
Fluorene	86-73-7	50	70	1,100	5,300
gamma-Hexachlorocyclohexane (HCH)	58-89-9	4.2	4.4	0.98	1.8
Heptachlor	76-44-8	0.0000059	0.0000059	0.000079	0.000079
Heptachlor Epoxide	1024-57-3	0.000032	0.000032	0.000039	0.000039
Hexachlorobenzene	118-74-1	0.000079	0.000079	0.00028	0.00029
Hexachlorobutadiene	87-68-3	0.01	0.01	0.44	18
Hexachlorocyclohexane (HCH)-Technical	608-73-1	0.0066	0.010	0.0123	0.0414
Hexachlorocyclopentadiene	77-47-4	4	4	40	1,100
Hexachloroethane	67-72-1	0.1	0.1	1.4	3.3
Indeno(1,2,3-cd)pyrene	193-39-5	0.0012	0.0013	0.0038	0.018
Isophorone	78-59-1	34	1,800	35	960
Methoxychlor	72-43-5	0.02	0.02	100	---

**Comparison of EPA's 2015 Final Updated Human Health AWQC and Previous AWQC
June 2015**

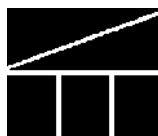
Pollutant	CAS No.	2015 EPA Human Health AWQC for the Consumption of		Previous EPA Human Health AWQC for the Consumption of	
		Water + Organism (ug/L)	Organism Only (ug/L)	Water + Organism (ug/L)	Organism Only (ug/L)
Methyl Bromide	74-83-9	100	10,000	47	1,500
Methylene Chloride	75-09-2	20	1,000	4.6	590
Nitrobenzene	98-95-3	10	600	17	690
Pentachlorobenzene	608-93-5	0.1	0.1	1.4	1.5
Pentachlorophenol	87-86-5	0.03	0.04	0.27	3
Phenol	108-95-2	4,000	300,000	10,000	860,000
p,p'-Dichlorodiphenyldichloroethane (DDD)	72-54-8	0.00012	0.00012	0.00031	0.00031
p,p'-Dichlorodiphenyldichloroethylene	72-55-9	0.000018	0.000018	0.00022	0.00022
p,p'-Dichlorodiphenyltrichloroethane (DDT)	50-29-3	0.000030	0.000030	0.00022	0.00022
Pyrene	129-00-0	20	30	830	4,000
Tetrachloroethylene (Perchloroethylene)	127-18-4	10	29	0.69	3.3
Toluene	108-88-3	57	520	1,300	15,000
Toxaphene	8001-35-2	0.00070	0.00071	0.00028	0.00028
trans-1,2-Dichloroethylene (DCE)	156-60-5	100	4,000	140	10,000
Trichloroethylene (TCE)	79-01-6	0.6	7	2.5	30
Vinyl Chloride	75-01-4	0.022	1.6	0.025	2.4

*AWQC for this chemical were not provided in EPA's previous update.

Attachment 3

Adverse impact notification sent to Joint Commission on Administrative Rules, House Committee on Appropriations, and Senate Committee on Finance (COV § 2.2-4007.04.C): Yes ☒ Not Needed ☐

If/when this economic impact analysis (EIA) is published in the *Virginia Register of Regulations*, notification will be sent to each member of the General Assembly (COV § 2.2-4007.04.B).



Virginia Department of Planning and Budget **Economic Impact Analysis**

9 VAC 25-260 Water Quality Standards

Department of Environmental Quality

Town Hall Action/Stage: 3171/5343

June 16, 2017

Summary of the Proposed Amendments to Regulation

The State Water Control Board (Board) proposes to adopt the most recent water quality standards recommended by the United States Environmental Protection Agency (EPA) for ammonia and cadmium criteria for protection of aquatic life; 94 chemical pollutant criteria, and the bacteria criteria and assessment methodology for protection of human health.

Result of Analysis

The proposed regulation may introduce substantial costs (possibly over one-half billion dollars) on affected point sources and will likely benefit aquatic life and human health. The costs that potentially impacted dischargers might have to spend on treatment upgrades to meet more stringent criteria depend on individual permit requirements that are site-specific and variable. As a result, there is insufficient data to accurately compare the magnitude of the benefits versus the costs. Detailed analysis of the benefits and costs are in the next section.

Estimated Economic Impact

This regulation establishes water quality standards for surface waters of the Commonwealth. Criteria are based on the maximum acceptable amount of pollutants, that directly affect aquatic life and /or human health, that can be discharged into receiving waters and not exceed criteria protective of designated uses. Federal and state mandates in the Clean Water

Act at §303(c), 40 CFR 131 and the Code of Virginia in §62.1-44.15(3a) require that these water quality standards be evaluated every three years. In addition, §303(a) of the Clean Water Act requires the EPA to develop and publish water quality criteria that reflect the latest scientific knowledge. EPA recommendations are purely based on protection of aquatic life and human health and do not reflect consideration of economic impacts or the technological feasibility of meeting pollutant concentrations in ambient water. These criteria are not rules, nor do they automatically become part of a state's water quality standards. States may adopt the criteria that the EPA publishes, modify the EPA's criteria to reflect site-specific conditions, or adopt different criteria based on other scientifically defensible methods. The EPA must approve any new water quality standards adopted by a state before they can be used for Clean Water Act purposes. Should a state fail to update its standards, the EPA may adopt and enforce water quality criteria on behalf of the state. In this action, the Board proposes to adopt the most recent water quality standards recommended by the EPA. Once adopted, these criteria become the basis of establishing permit limits and Total Maximum Daily Loads (TMDLs).

Freshwater Ammonia Criteria for Protection of Aquatic Life

In 2013, the EPA updated its 1999 recommendations for ambient freshwater ammonia criteria to reflect the newly discovered sensitive nature of freshwater mussels and snails to ammonia toxicity. According to the EPA¹ “Freshwater mussels are highly sensitive to ammonia toxicity and represent the most sensitive species in the dataset for the criteria recommendations. New science has demonstrated that freshwater snails are also sensitive to ammonia toxicity. Both mussels and snails are important to the environment because they serve as food sources for other organisms in the food web and provide vital services in improving and maintaining water quality. Specifically, mussels are filter feeders and can filter nutrients, toxics, and other pollutants out of the water, thereby helping to control the levels of these pollutants and reduce exposure to humans and other aquatic organisms. Snails feed on organic debris including algae, which helps to reduce the effects of eutrophication and keeps bottom substrates clean for other benthic organisms.”

The allowable total ammonia nitrogen level depends on several factors (i.e. whether it is for acute or chronic levels, whether trout are absent or present, various combinations of pH and

¹ <https://www.epa.gov/sites/production/files/2015-08/documents/flexibilities-for-states-applying-epa-s-ammonia-criteria-recommendations.pdf>

temperature levels, whether mussels and early life stages of fish are absent or present). Thus, the proposed regulation contains hundreds of ammonia criteria in tables for various combinations of the relevant factors. The proposed ammonia criteria are more stringent than the current limits by a factor of between 2.2 times and 5.9 times for all possible combinations of pH and temperature. However, the proposed criteria are about twice as stringent as the current criteria based on an assumed pH of 7 and temperature of 20 degrees Celsius. Criteria that are more stringent can result in more stringent effluent limits for Virginia Pollutant Discharge Elimination System (VPDES) permitted dischargers. Those sources with monitoring requirements in their permit may also be affected if their discharges have the potential to exceed the proposed ammonia criteria. According to DEQ, the estimated number of potentially affected facilities due to the proposed amendments to the ammonia criteria is 370 and includes those facilities with effluent limitations and those with monitoring requirements but no limits.

The primary and most widespread potential cost increase associated with all of the proposed amendments in this action would be from meeting more stringent ammonia limits for municipal dischargers to comply with the revised ammonia criteria. A permit holder may reduce the ammonia discharge through nitrification, which would convert ammonia into nitrate-nitrogen and then discharge nitrate into the water. If nitrate cannot be discharged into the water because of permit limits, then the facility may install a nitrification/denitrification system, convert nitrate-nitrogen from the first step into the harmless gas form of nitrogen, and discharge into the air instead of water.

The facilities most likely to be affected are those in the Chesapeake Bay watershed with design flows less than 0.1 million gallons/day (MGD) located east of Interstate 95 and those with design flows less than 0.5 MGD west of I-95. Permittees with discharges outside of the Bay watershed, particularly those facilities that are large in volume compared to the receiving stream, may also have similar potential financial impacts.

According to DEQ, there are approximately 220 discharge permits issued in the Chesapeake Bay watershed with either ammonia limits or ammonia monitoring requirements. Although ammonia limits or monitoring requirements are part of the permits, it may be assumed those facilities with ammonia limits east of Interstate 95 with a design flow equal to or greater than 0.1 MGD and those with ammonia limits west of I-95 with a design flow equal to or greater

than 0.5 MGD either currently have ammonia control requirements or will be required to nitrify/denitrify to comply with the total nitrogen waste load allocations of the Water Quality Planning Management Regulation (9VAC25-720 et seq) and the Chesapeake Bay Watershed General Permit Regulation for Total Nitrogen and Total Phosphorus Discharges and Nutrient Trading (9VAC25-820). DEQ believes that those facilities utilizing a nitrification/denitrification wastewater treatment process to meet total nitrogen concentration limits greatly reduce the ammonia concentrations in effluent to very low levels and consequently will most likely meet the more stringent ammonia criteria without additional effort.

There are approximately 20 facilities east of Interstate 95 with flows less than 0.1 MGD. It is anticipated that these facilities have the greatest likelihood to incur impacts due to more stringent ammonia criteria. Of these, 17 now have numeric ammonia limits and it is likely they have nitrification capability to meet current limits. However, an upgrade and/or operational procedure modification may be necessary to comply with newer, more stringent ammonia limits.

There are approximately 119 facilities west of I-95 with design flows less than 0.5 MGD. It is anticipated that these facilities have the greatest likelihood to incur impacts due to more stringent ammonia criteria. All but 2 have numeric ammonia limits now and it is likely that the facilities with numeric limits have nitrification capability to meet current limits; however, an upgrade and/or operational procedure modification may be necessary to comply with newer, more stringent ammonia limits. It is unknown how many of these would install a simple nitrification system or an advanced nitrification/denitrification system.

There are approximately 150 discharge permits issued outside of the Chesapeake Bay watershed with either ammonia limits or ammonia monitoring requirements. It is possible that those with only monitoring requirements will incur costs should more stringent effluent limits be necessary. All but 8 have numeric ammonia limits now and it is likely these facilities have nitrification capability to meet current limits; however, an upgrade and/or operational procedure modification may be necessary to comply with newer, more stringent ammonia limits.

DEQ estimates that a simple nitrification system costs about \$372,000 for a 0.10 MGD sewage treatment plant. The cost of an advanced treatment system capable of both nitrification and denitrification can range from \$750,000 to \$8,195,000 depending on the current level of treatment and volume of discharge. These costs are one-time capital expenditures and are

unlikely to recur during the useful life of the equipment; however, operations and maintenance costs would be ongoing. Operations and maintenance costs for nitrification/denitrification could be \$23,000/a year for a 0.10-MGD plant to \$195,000/a year for a 0.60-MGD plant.

As an example, for a totally new 0.7 MGD plant, roughly 50% of the cost of the new oxidation ditch, and 100% of the submerged diffused outfall, etc., is attributed to the cost for ammonia removal. In this case, roughly 9% of the total cost can be attributed to ammonia removal or roughly \$500,000 of the \$5,655,000 construction bid price.

In another example, a facility design flow upgrade from 4.0 to 6.5 MGD, the cost attributable to ammonia removal, is more complicated because the oxidation ditch volume is set, with no expansion of the aerator volume, but there is a hydraulic increase of the overall facility. Roughly, 30% of the aeration system, filter, and digester upgrade costs, and 100% of the integrated fixed-film activated sludge costs are attributable to ammonia removal. This adds up to about \$1,720,700 or approximately 13% of the overall bid price of \$13,278,600. It is estimated the cost per gallon of ammonia removal in the examples given above for the new construction is \$0.71/gallon and cost per gallon for the upgrade is \$0.26/gallon.

The Virginia Association of Municipal Wastewater Agencies (VAMWA) has prepared an estimate of economic impact of the proposed ammonia criteria on its members and other sewage treatment facilities. Utilizing the capital and operating and maintenance costs estimated by the EPA for various design ranges, the VAMWA's study estimates that capital costs will reach \$512.3 million and ongoing operating and maintenance costs will be \$33.6 million per year for 490 affected facilities in 2014 dollars. These costs are expected to be distributed over a 10-year period as VPDES permits are reissued with compliance schedules. The study projects much higher relative costs for smaller facilities such as schools and public rest stops compared to larger facilities. The VAMWA estimate does not address upgrades and costs for commercial or industrial facilities with direct discharge permits, upgrades and costs for pretreatment that public treatment facilities may require of commercial and industrial facilities that discharge into public collection systems, and development and implementation costs of TMDLs for additional waters that may be listed for aquatic life impairment as a result of more stringent criteria.

A TMDL is a plan to improve the quality of an impaired water body. Development of TMDLs requires significant amounts of labor to collect data, to determine land uses, animal

densities, crop densities, the number of septic systems, contributions from point and nonpoint sources, and construction of a simulation model. DEQ usually incurs the development costs, but some funding is provided from the federal government. Implementation of a TMDL may represent significant costs to pollution sources as well. For example, fencing may be required to prevent direct deposition into water from cattle, a buffer area may be needed to function as a filter for agricultural runoff, and failing septic systems may have to be fixed. In addition to these, the implementation involves public participation, and staff travel which add to the overall costs. There are various cost share and incentive programs for TMDL implementation. The magnitude of TMDL costs varies from project to project and is pollutant specific. For example, the cost of a bacteria TMDL project costs range from \$41,000 to \$145,000.

According to DEQ, there is currently one outstanding aquatic life use impairment attributed to ammonia that has yet to be prioritized. There are no ammonia related TMDLs at this time. However given the more stringent values proposed by this regulation, that situation could change. DEQ does not know the potential impact of this change on development and implementation costs of TMDLs because a TMDL determination is site specific.

There appears to be general consensus that the proposed ammonia criteria may have a substantial economic impact particularly on smaller facilities. In addition, there appears to be a general agreement on the unit cost estimates provided above for various facility design sizes. However, there appears to be a difference of opinion on how many facilities will be able to meet the proposed criteria without having to build a new facility or upgrade. For example, the VAMWA study presumes that a substantial number of major Chesapeake Bay watershed facilities that currently nitrify will not be able to meet permit limits while DEQ believes that they will.

The EPA allows certain flexibilities in adopting water quality criteria. For example, states are allowed to adopt site-specific criteria to take into account absence or presence of sensitive species. After consultation with the Virginia Department of Game and Inland Fisheries, Virginia Department of Conservation and Recreation, and United States Fish and Wildlife Service, the Board concluded that it would assume the presence of freshwater mussels in any perennial freshwater stream in Virginia but does propose to allow point sources to demonstrate an absence of sensitive species on a site-by-site basis. Thus, some sources may be able to avoid compliance

costs if they can demonstrate lack of sensitive species in their locations. However, such a demonstration would likely cost some money.

The Board also proposes to allow compliance schedules longer than 5 years under certain conditions for reissuance of existing permits. These flexibilities would help sources comply with the new criteria to some degree.

Freshwater & Saltwater Cadmium Criteria for Protection of Aquatic Life

In 2016, the EPA updated its 2001 recommended cadmium aquatic life ambient water quality criteria in order to reflect the newest toxicity data for 75 new species and 49 new genera. The Board proposes to adopt the EPA's recommended standard for cadmium. There are four aquatic life criteria (i.e. acute and chronic limits for freshwater and saltwater). The proposed cadmium criteria are more stringent than the current limits by a factor between 1.1 times and 2.2 times. Criteria that are more stringent may mean additional treatment is needed to remove more cadmium before discharging effluent into surface waters. Those permitted treatment plants with monitoring requirements in their permit may also be affected if their discharges have the potential to exceed the proposed criteria.

According to DEQ, there are 24 active discharge permits with either numeric cadmium limits or monitoring requirements. Of these, 10 have effluent limits and 14 have monitoring requirements but no limits. Monitoring requirements without discharge limits typically result from a permit review using a "Reasonable Potential Analysis" that indicates the facility may have a particular parameter in its effluent, ergo the monitoring requirement. The monitoring data is used in subsequent permit reissuances to determine if discharge limits should be included. Given that the cadmium freshwater criteria are becoming more stringent it is assumed facilities with only monitoring requirements may be the most likely to be affected.

Furthermore, the most likely impact expected is for industrial dischargers. However, DEQ has no cost information on retrofits for these types of facilities and each would be unique due to the type of industry, wastewater characteristics and treatment technology used. Thus, there are no available estimates for the potential costs at this time. As far as TMDL costs, there is one aquatic life use impairment near Lake Anna with cadmium listed as the impairment cause, but it has yet to be put on the priority list and as such an active TMDL has yet to be developed. A more stringent cadmium standard may add additional waters to the impaired waters list but DEQ does

not know if that is the case at this time because such determinations are site specific. On the other hand, more stringent cadmium criteria based on latest scientific information will likely provide better protection for aquatic life.

Water Quality Criteria for Protection of Human Health

In 2015, the EPA published water quality criteria for the protection of human health for 94 chemical pollutants. The revisions stemmed from the latest scientific information and the EPA policies, including updated body weight, drinking water consumption rate, fish consumption rate, bioaccumulation factors, health toxicity values, and relative source contributions. Each pollutant has two criteria (i.e. one for public water supply and one for all other waters) for a total of 188 individual criteria concentrations. 57 of these criteria would become less stringent, 127 would become more stringent, 2 would be unchanged, and 2 are new additions and do not have criteria in the current regulation.

Though 127 criteria that are more stringent have the potential to increase compliance costs, according to DEQ, the majority of the human health criteria pollutants tend to be rather exotic compounds and discharger specific. Thus, the potential compliance cost to dischargers is unknown at this time. In addition, it is noted that many of the human health criteria toxins are not monitored routinely unless there is a known or suspected problem. DEQ does not believe there will be additional TMDL designations because of this change but that expectation is uncertain.

Due to anti-backsliding rules, existing permit limits cannot be made less stringent. Thus, 57 less stringent criteria are unlikely to have an effect on current permit limits. However, potential new sources discharging one of these pollutants will be subject to less stringent limits and may avoid installing treatment systems. Thus, new sources may realize some cost savings in potential treatment costs.

127 more stringent and 2 new human health criteria have the potential to help reduce many types of illnesses including cancer. However, some of these rather exotic pollutants may not be present in the Commonwealth's surface waters. If this is the case, no immediate significant impact is likely to be realized, but if any discharge containing these chemicals is discovered, health risks originating from the drinking water and fish consumption may be reduced and the source may have to incur some additional compliance costs.

In short, very few limits are based on human health criteria so no significant impact from the amendments is expected. However, given the large number of human health criteria amendments, it is difficult to determine with certainty at this time what the cost savings or expenses may be.

Bacteria Criteria for Protection of Human Health

The Board proposes to revise the bacteria criteria and assessment methodology for protection of human health. *E. coli* and Enterococci concentrations are used as bacteria indicators for the presence of illness inducing pathogens in fresh- and saltwater respectively.

The aim of the proposed changes is to align Virginia's methodology and criteria with those recommended by EPA, which are expressed in terms of a statistical threshold value (replacing the single sample maximum) and a geometric mean. The current assessment methodology for the single sample maximum allows no more than 10% of the total samples to exceed the criteria over the assessment period that is typically a six-year monitoring database. The proposed statistical threshold value is a similar measure utilized by EPA. Under the proposed regulation, no more than 10% of the total samples may exceed the statistical threshold value using all monitoring data collected up to a 90-day period. Bacteria criteria are also expressed in terms of a geometric mean, which can only be calculated under the current water quality standards using at least 4 observations taken within a 30-day period. The geometric mean standard is a "never-to-be-exceeded" value. Its exceedance puts the water body on the impaired waters list. The intent of the amendment is to switch to a 90-day assessment period to enable the use of more monitoring data, which will maximize the number of monitoring stations that are assessed against both geometric mean and statistical threshold value criteria. The proposed amendment will adopt 2012 EPA recommended statistical threshold values for *E. coli* and Enterococci concentrations and are higher than the current values used for the single sample maximum. The geometric mean concentrations remain unchanged.

The rationale behind the amendment is the proposed bacteria criteria represent the most recent scientific basis for criteria designed to protect primary contact recreational uses. Also, the Federal BEACH Act of 2000 requires that, not later than 36 months after the date of publication by the EPA of new or revised water quality criteria for pathogens or pathogen indicators, each state having coastal recreation waters shall adopt and submit to the EPA new or revised water

quality standards for the coastal recreation waters of the state for all pathogens and pathogen indicators to which the new or revised water quality criteria are applicable. In this case, the most recent EPA criteria were published in 2012.

One of the consequences resulting from these changes is that more waters may be assessed as impaired for the recreational use. Exceedances of the bacteria criteria are the leading cause of TMDL designations; about 80% of existing impairments are due to high bacteria concentrations. There are currently 441 bacteria impairments that are waiting for a development of a TMDL. It is not expected amendments to bacteria criteria will affect dischargers as end-of-pipe limits for bacteria are set at the criterion. However, the number of TMDLs that must be developed may increase.

Businesses and Entities Affected

The proposed amendments particularly affect municipal wastewater treatment facilities and industrial plants that discharge to surface waters of the Commonwealth.

The estimated number of potentially affected facilities due to proposed amendments to the ammonia criteria is 370 (approximately 220 discharge permits issued in the Chesapeake Bay watershed and 150 discharge permits issued outside of the Chesapeake Bay watershed).

According to DEQ, there are 24 active discharge permits with either numeric cadmium limits or monitoring requirements.

The number of potentially effected facilities due to the amended human health criteria and bacteria criteria is not known.

The proposed changes may also affect new and expanded point sources as well as nonpoint sources in the future.

Localities Particularly Affected

The proposed changes apply statewide. Localities with permits that may have to upgrade or install new equipment will be particularly effected.

Projected Impact on Employment

The net impact on employment is not known. A facility requiring an upgrade or monitoring under the proposed regulations will have to hire labor to accomplish those goals.

However, increased costs may also discourage expansion or the building of new plants reducing demand for labor.

Effects on the Use and Value of Private Property

Facilities likely to be affected the most are municipal wastewater treatment facilities. To the extent the proposed more stringent requirements introduce additional compliance costs on privately owned facilities, their asset values should decrease.

The proposed changes also have the potential to affect private property prices through improvements in environmental quality. However, such effects are usually contingent upon noticeable improvements. Since the magnitude of likely effects on environment is not known, no conclusive statements can be made about the effect on the value of private property.

Real Estate Development Costs

The proposed amendments do not directly affect real estate development costs.

Small Businesses:

Definition

Pursuant to § 2.2-4007.04 of the Code of Virginia, small business is defined as “a business entity, including its affiliates, that (i) is independently owned and operated and (ii) employs fewer than 500 full-time employees or has gross annual sales of less than \$6 million.”

Costs and Other Effects

Some of the industrial plants that discharge to surface waters of the Commonwealth will be associated with small businesses. The costs and other effects on them are the same as discussed above.

Alternative Method that Minimizes Adverse Impact

There are no clear alternative methods that would both comply with the Clean Water Act and cost less.

Adverse Impacts:

Businesses:

The adverse impact on businesses is the additional compliance costs discussed above.

Localities:

The adverse impact on localities is the additional compliance costs discussed above.

Other Entities:

The proposed amendments will not adversely affect other entities.

Legal Mandates

General: The Department of Planning and Budget has analyzed the economic impact of this proposed regulation in accordance with § 2.2-4007.04 of the Code of Virginia (Code) and Executive Order Number 17 (2014). Code § 2.2-4007.04 requires that such economic impact analyses determine the public benefits and costs of the proposed amendments. Further the report should include but not be limited to: (1) the projected number of businesses or other entities to whom the proposed regulatory action would apply, (2) the identity of any localities and types of businesses or other entities particularly affected, (3) the projected number of persons and employment positions to be affected, (4) the projected costs to affected businesses or entities to implement or comply with the regulation, and (5) the impact on the use and value of private property.

Adverse impacts: Pursuant to Code § 2.2-4007.04(C): In the event this economic impact analysis reveals that the proposed regulation would have an adverse economic impact on businesses or would impose a significant adverse economic impact on a locality, business, or entity particularly affected, the Department of Planning and Budget shall advise the Joint Commission on Administrative Rules, the House Committee on Appropriations, and the Senate Committee on Finance within the 45-day period.

If the proposed regulatory action may have an adverse effect on small businesses, Code § 2.2-4007.04 requires that such economic impact analyses include: (1) an identification and estimate of the number of small businesses subject to the proposed regulation, (2) the projected reporting, recordkeeping, and other administrative costs required for small businesses to comply with the proposed regulation, including the type of professional skills necessary for preparing required reports and other documents, (3) a statement of the probable effect of the proposed regulation on affected small businesses, and (4) a description of any less intrusive or less costly alternative methods of achieving the purpose of the proposed regulation. Additionally, pursuant to Code § 2.2-4007.1, if there is a finding that a proposed regulation may have an adverse impact on small business, the Joint Commission on Administrative Rules shall be notified.

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Final Regulation Agency Background Document

Agency name	State Water Control Board (Board)
Virginia Administrative Code (VAC) citation(s)	9VAC25-260
Regulation title(s)	Water Quality Standards
Action title	Triennial Review – Remaining Issues
Date this document prepared	

This information is required for executive branch review and the Virginia Registrar of Regulations, pursuant to the Virginia Administrative Process Act (APA), Executive Orders 17 (2014) and 58 (1999), and the *Virginia Register Form, Style, and Procedure Manual*.

Brief summary

Please provide a brief summary of the proposed new regulation, proposed amendments to the existing regulation, or the regulation proposed to be repealed. Alert the reader to all substantive matters or changes. If applicable, generally describe the existing regulation.

Amendments to Virginia's Water Quality Standards Regulation (9 VAC 25-260) have been adopted to revise sections 140 and 170, including revisions to bacteria criteria for human health protection in recreation waters; revisions to cadmium criteria for the protection of aquatic life; and, amendments to update 94 human health criteria. Amendments to the ammonia criteria were deferred due to recent legislation adopted by the 2018 General Assembly. Virginia Code now requires that Ammonia criteria amendments cannot be adopted unless the Board includes in such adoption a phased implementation program that addresses the potential adverse impact on permitted dischargers across the State. DEQ staff intends to develop this phased implementation program and return to the Board with recommendations for approval before the end of this year.

The amendments resulted from continuation of the Triennial Review (TR) of the water quality standards which was the subject of a Notice of Intended Regulatory Action published in the Virginia Register of Regulations on August 12, 2013 (Volume 29, Issue 25). The State Water Control Board, at its meeting on

January 14, 2016, adopted amendments to the water quality standards but decided to postpone the adoption of the amendments included in this proposal in response to public comments and concerns and to provide an opportunity for the Department of Environmental Quality (DEQ) to gather additional information, utilize the most current information and further consult with interested stakeholders. DEQ reconvened the TR Regulatory Advisory Panel which met four times, then presented amendments to the Board at their December 2016 meeting and received authorization for public comment on the amendments. (For details of the prior action see <http://townhall.virginia.gov/L/ViewAction.cfm?actionid=4017>).

The following substantive changes have been made since the proposed action was published:

- Changing the criteria value of butyl benzyl phthalate for “Public Water Supplies” and “All Other Surface Waters” in Section 140 from 0.10 micrograms per liter (ug/L) to 1.0 ug/L to conform to the same carcinogenicity risk level (10^{-5}) used for all other carcinogens.
- Changing the criteria value of 2-(2,4,5 Trichlorophenoxy) propionic acid (Silvex) for “Public Water Supplies” and “All Other Surface Waters” in Section 140 to 100 ug/L and 400 ug/L, respectively. Current criterion is 50 ug/L for Public Water Supplies only.
- Defer amendments to the Ammonia criteria for surface waters, 9 VAC 25-260-155.
- Bacteria standard (Section 170) has been revised so that it specifies a 90-day duration for assessment of both the geometric mean (GM) and the statistical threshold value (STV). Changes to wording for clarity, and changed units from colony forming units (CFU) per 100 milliliters to “counts” per 100 milliliters. Language was added to cover the type and frequency of bacterial effluent monitoring at permitted discharges requiring disinfection. Language regarding secondary contact recreation criteria proposed to be stricken will be retained.

Acronyms and definitions

Please define all acronyms used in the Agency Background Document. Also, please define any technical terms that are used in the document that are not also defined in the “Definition” section of the regulations.

CFU	Colony Forming Units
DEQ	Department of Environmental Quality
DGIF	Virginia Department of Game and Inland Fisheries
EPA	U.S. Environmental Protection Agency
GM	Geometric Mean
SSM	Single Sample Maximum
STV	Statistical Threshold Value
USFWS	U.S. Fish and Wildlife Service
VDH	Virginia Department of Health

Statement of final agency action

Please provide a statement of the final action taken by the agency including: 1) the date the action was taken; 2) the name of the agency taking the action; and 3) the title of the regulation.

The State Water Control adopted the amendments to the Water Quality Standards Regulation (9 VAC 25-260) at their meeting on....**DATE TBD**

Legal basis

Please identify the state and/or federal legal authority to promulgate this proposed regulation, including: 1) the most relevant citations to the Code of Virginia or General Assembly chapter number(s), if applicable; and 2) promulgating entity, i.e., agency, board, or person. Your citation should include a specific provision authorizing the promulgating entity to regulate this specific subject or program, as well as a reference to the agency/board/person's overall regulatory authority.

Federal and state mandates in the Clean Water Act at 303(c), 40 CFR 131 and the Code of Virginia in §62.1-44.15(3a) require that water quality standards be reviewed, and, as appropriate, adopted, modified, or cancelled at least once every three years. These are the most relevant laws and regulations. The promulgating entity is the State Water Control Board.

The Clean Water Act authorizes restoration and maintenance of the chemical, physical, and biological integrity of the Nation's waters. The Clean Water Act at 303(c)(1) requires that the states hold public hearings for the purpose of reviewing applicable water quality standards and, as appropriate, modifying and adopting standards.

The Federal regulations at 40 CFR 131 authorize requirements and procedures for developing, reviewing, revising and approving water quality standards by the States as authorized by section 303(c) of the Clean Water Act. 40 CFR 131 specifically requires the states to adopt criteria to protect designated uses. The State Water Control Law (Virginia Code Title 62.1 – Waters of the State, Ports and Harbors) authorizes protection and restoration of the quality of state waters, safeguarding the clean waters from pollution, prevention and reduction of pollution and promotion of water conservation. The State Water Control Law at §62.1-44.15(3a) requires the Board to establish standards of quality and to modify, amend or cancel any such standards or policies. It also requires the Board to hold public hearings, at least once every three years, for the purpose of reviewing the water quality standards, and, as appropriate, adopting, modifying or canceling such standards.

The authority to adopt standards as provided by the provisions in the previously referenced citations is mandated, although the specific standards to be adopted or modified are discretionary to the Environmental Protection Agency and the state. The Office of the Attorney General has certified that the agency has the statutory authority to promulgate final text of the regulation.

Purpose

Please explain the need for the new or amended regulation. Describe the rationale or justification of the proposed regulatory action. Describe the specific reasons the regulation is essential to protect the health, safety or welfare of citizens. Discuss the goals of the proposal and the problems the proposal is intended to solve.

The rulemaking is essential to the protection of health, safety or welfare of the citizens of the Commonwealth because proper water quality standards protect water quality and living resources of Virginia's waters for consumption of fish and shellfish, recreational uses and conservation in general. These standards will be used in setting Virginia Pollutant Discharge Elimination System Permit limits and for evaluating the waters of the Commonwealth for inclusion in the Clean Water Act Section 305(b) water quality characterization report and on the Section 303(d) list of impaired waters. Waters not meeting standards will require development of a Total Maximum Daily Load under the Clean Water Act at Section 303(e). The Water Quality Standards are the cornerstone for all these other programs. It is the goal to provide the citizens of the Commonwealth with a technical regulation that is protective of water quality in surface waters, reflects recent scientific information, reflects agency procedures and is reasonable and practical. The environment will benefit because implementation of these amendments will result in better

water quality in the Commonwealth for recreation, consumption of fish and shellfish and protection of aquatic life.

Substance

Please briefly identify and explain the new substantive provisions, the substantive changes to existing sections, or both.

Table of Parameters (Toxics) § 9 VAC 25-260-140

EPA's 2016 nationally recommended cadmium criteria for the protection of aquatic life reflect toxicity data for 75 new species and 49 new genera. As in the 2001 criteria, the 2016 freshwater acute criterion was derived to be protective of aquatic species and was lowered further to protect the commercially and recreationally important rainbow trout. In addition, the duration of the 2016 acute criterion was changed to one-hour. Both changes are consistent with EPA's current aquatic life criteria guidelines. Modest changes to the saltwater acute and chronic criteria are due to inclusion of additional sensitive genera in the toxicity database used to derive the values.

In June 2015, EPA issued recommended updates for 94 human health parameters. EPA's recommended criteria updates included recent research into exposure factors (body weight, drinking water consumption rates, fish consumption rate, and relative source contribution), bioaccumulation factors, and toxicity factors (reference dose, cancer slope factor). Each human health parameter has two criteria (one for Public Water Supply and one for all other waters) for a total of 188 individual criteria concentrations:

- 127 of these would become more stringent
- 57 would become less stringent
- 2 remain unchanged
- 2 are new additions; did not have criteria in the current Regulation

Ammonia Criteria § 9 VAC 25-260-155

Amendments to the ammonia criteria are being further deferred due to recent legislation adopted by the 2018 General Assembly. Virginia Code now requires that Ammonia criteria amendments cannot be adopted unless the Board includes in such adoption a phased implementation program that addresses the potential adverse impact on permitted dischargers across the State. DEQ staff intends to develop this phased implementation program and return to the Board with recommendations for approval before the end of this year.

Bacteria Criteria § 9 VAC 25-260-170

In 2012, EPA published nationally recommended Recreational Water Quality Criteria for assessing potential risks to humans posed by bacteria in surface waters. Amendments were proposed to incorporate those updates into the Virginia water quality standards and replace the current bacteria criteria for the protection of the primary contact recreation use, which applies to all of Virginia's surface waters. The revised EPA recommendations include a geometric mean (GM) value as well as a statistical threshold value (STV). The GM is a never-to-be-exceeded value; the STV is a value that should not have a greater than 10% exceedance frequency. Amendments also include provisions covering bacterial limits and monitoring periods in VPDES permits for discharges requiring disinfection.

Issues

Please identify the issues associated with the proposed regulatory action, including: 1) the primary advantages and disadvantages to the public, such as individual private citizens or businesses, of implementing the new or amended provisions; 2) the primary advantages and disadvantages to the agency or the Commonwealth; and 3) other pertinent matters of interest to the regulated community,

government officials, and the public. If there are no disadvantages to the public or the Commonwealth, please indicate.

- 1) The primary advantages to the public are that the updated numerical toxics and human health criteria are based on more recent scientific information to protect water quality and human health through the consumption of fish and drinking water. The disadvantage is that entities currently discharging to state waters may have to incur the costs of increased treatment to meet new or revised water quality criteria that are more stringent.
- 2) The advantage to the agency or the Commonwealth that will result from the adoption of these amendments will be more accurate and scientifically defensible permit limits, assessments and clean-up plans.
- 3) The regulated community will find the amendments pertinent to their operations, particularly where the numerical criteria are more stringent since that may require additional capital or operating costs for control in their discharge. There is no disadvantage to the agency or the Commonwealth that will result from the adoption of these amendments.

Requirements more restrictive than federal

Please identify and describe any requirement of the proposal which is more restrictive than applicable federal requirements. Include a rationale for the need for the more restrictive requirements. If there are no applicable federal requirements or no requirements that exceed applicable federal requirements, include a statement to that effect.

There are no requirements that exceed applicable federal requirements.

Localities particularly affected

Please identify any locality particularly affected by the proposed regulation. Locality particularly affected means any locality which bears any identified disproportionate material impact which would not be experienced by other localities.

The amendments made are to parameters or pollutants with statewide application. Localities across the State are potentially and equally affected. However, no known disproportionate material impacts have been identified.

Changes made since the proposed stage

*Please list all changes that made to the text of the proposed regulation and the rationale for the changes; explain the new requirements and what they mean rather than merely quoting the proposed text of the regulation. *Please put an asterisk next to any substantive changes.*

Section number	Requirement at proposed stage	What has changed	Rationale for change
9VAC25-260-140. Criteria for surface water	The original proposal included modifications of 93 criteria designed to	The criteria value of 2-(2,4,5 Trichlorophenoxy) propionic acid (Silvex) for	In 2015, EPA issued revised recommended criteria for 94 human

	<p>protect human health.</p> <p>Butyl benzyl phthalate criteria value was 0.10 ug/L for “Public Water Supplies” and “All Other Surface Waters”.</p>	<p>“Public Water Supplies” and “All Other Surface Waters” has been changed to 100 and 400 ug/L, respectively. Current regulation is 50 ug/L for Public Water Supplies only.</p> <p>Criteria value for butyl benzyl phthalate was changed from 0.10 ug/L to 1.0 ug/L.</p>	<p>health criteria that reflect the latest scientific information and EPA policies, including updated factors for exposure, bioaccumulation, and toxicity data. The omission of the updated criteria for Silvex from the regulatory proposal was an oversight. This parameter is accounted for in the total count (94) of pollutant criteria being amended.</p> <p>EPA nationally recommended criteria for carcinogens are calculated utilizing a risk level factor of 10^{-6}, though States may choose to use 10^{-5}. Virginia expresses all other carcinogen criteria values using a 10^{-5} risk level factor. Butyl benzyl phthalate was changed to conform to this practice.</p>
9VAC25-260-155. Ammonia surface water quality criteria	The proposal included adopting EPA’s recently revised (2013) recommended water quality criteria for ammonia in freshwater.	Postponing the adoption of these ammonia criteria from this rulemaking and addressing the adoption of these updated criteria until a future Board meeting.	This amendment is deferred due to recent legislation adopted by the 2018 General Assembly. Virginia Code now requires that ammonia criteria amendments cannot be adopted unless the Board includes in such adoption a phased implementation program that addresses the potential adverse impact on permitted dischargers across the State.
9VAC25-260-170. Bacteria; Other Recreational Waters.	The proposed criteria utilized the same indicator organisms and the geometric mean (GM) criteria values remain the same. The GM criteria is a never-to-be-exceeded value. The GM is to be based on all monitoring data collected during up to a 90-day period. There is a Statistical Threshold Value (STV) similar to the	Language has been revised to remove the word “monthly”. Changes to wording for clarity, and changed units from ‘colony forming units’ (CFU) to “counts” per 100 milliliters. Language added to cover the type and frequency of bacterial effluent monitoring at permitted discharges requiring disinfection. Language regarding	The word “monthly” was an error and removed so it does not contradict the specified 90-day duration for assessment of both the GM and the STV. Language referring to the type and frequency of bacterial effluent monitoring at permitted discharges requiring disinfection are permitting policy elements and it is

	existing single sample maximum. The STV is a value that should not have a greater than 10% exceedance frequency. Both the GM and STV apply. Language was added to indicate that VDH shall make determinations regarding beach advisories or closures. Secondary contact category was proposed to be deleted.	secondary contact recreation criteria proposed to be stricken will be retained and language for VDH determination of beach closures/notifications was deleted.	appropriate to specify this in regulation now that instream assessment periods up to 90 days may be used. The section covering secondary contact recreation criteria was originally proposed to be stricken because EPA's current (2012) recommendations did not provide any criteria for this classification. Upon further consideration, it was decided to retain this section in the event that EPA does provide recommendations in the future. Language regarding beach notifications and/or closures was removed because VDH is promulgating a regulation for consideration by the Board of Health that grants VDH the authority to issue recreational water advisories.
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Public comment

Please summarize all comments received during the public comment period following the publication of the proposed stage, and provide the agency response. If no comment was received, please so indicate.

Commenter	Comment	Agency response
See Attachment 1	See Attachment 1	See Attachment 1

All changes made in this regulatory action

Please list all changes that are being proposed and the consequences of the proposed changes. Describe new provisions and/or all changes to existing sections. Explain the new requirements and what they mean rather than merely quoting the proposed text of the regulation

Current section	Proposed new section	Current requirement	Proposed change and rationale
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number	number, if applicable		
9VAC25-260-140. Criteria for surface water	N/A	Current cadmium criteria for freshwater are based upon 1985 EPA guidance and saltwater criteria are expressed as "total recoverable".	The proposed change mirrors EPA's 2016 nationally recommended criteria. The update incorporates additional toxicity data for the development of both freshwater and estuarine/marine acute and chronic criteria and new toxicity data related to water hardness, and the acute criterion was lowered further to protect the commercially and recreationally important rainbow trout. Freshwater criteria now include a conversion factor and the criteria are expressed as the dissolved fraction.
9VAC25-260-140. Criteria for surface water	N/A	Current human health criteria for 92 toxic parameters are based upon various past iterations of EPA guidance.	Update all 92 toxics and add 2 new chemicals. In 2015, EPA issued new nationally recommended criteria for these 94 toxic parameters. The criteria recommendations are based on updated exposure inputs, bioaccumulation factors, health toxicity values, and relative source contributions.
9VAC25-260-170. Bacteria; Other Recreational Waters.	N/A	Current criteria consists of a geometric mean (GM) value for the indicator organisms (E. coli and enterococci) but only if 4 or more monitoring samples within a month are available and is never to be exceeded. No more than 10% of the total samples may exceed the single sample maximum (SSM) criteria. If there are not 4 or more samples for calculating a GM, only the SSM applies for assessment purposes. There is a category for 'secondary contact recreation' to which waters may be assigned if appropriate. Secondary contact waters have higher criteria values. Additionally, criteria values are listed for beach advisories or closures.	Proposed amendments are intended to conform with EPA's 2012 nationally recommended bacteria criteria. The GM values for freshwater and marine water are unchanged; the STV replaces the SSM for both freshwater and marine water and are slightly higher; revise the assessment period for both the GM and STV to consider all data collected in up to a 90-day period; and, include provisions covering bacterial limits and monitoring periods in VPDES permits for discharges requiring disinfection. Secondary contact recreation waters category, which is based on prior EPA recommendations, has been retained in the event that EPA does provide recommendations in the future. Proposed language has been deleted regarding application of criteria for beach notifications/closures and reference to the VDH as the agency responsible for any such notifications and/or closures. VDH is promulgating a regulation for consideration by the Board of Health that grants VDH the authority to issue recreational water advisories.

Family impact

Please assess the impact of this regulatory action on the institution of the family and family stability including to what extent the regulatory action will: 1) strengthen or erode the authority and rights of parents in the education, nurturing, and supervision of their children; 2) encourage or discourage economic self-sufficiency, self-pride, and the assumption of responsibility for oneself, one's spouse, and one's children and/or elderly parents; 3) strengthen or erode the marital commitment; and 4) increase or decrease disposable family income.

The direct impact resulting from the development of water quality standards is for the protection of public health and safety and the protection of water quality in surface waters, which has only an indirect impact on families.

Regulatory flexibility analysis

Please describe the agency's analysis of alternative regulatory methods, consistent with health, safety, environmental, and economic welfare, that will accomplish the objectives of applicable law while minimizing the adverse impact on small business. Alternative regulatory methods include, at a minimum: 1) the establishment of less stringent compliance or reporting requirements; 2) the establishment of less stringent schedules or deadlines for compliance or reporting requirements; 3) the consolidation or simplification of compliance or reporting requirements; 4) the establishment of performance standards for small businesses to replace design or operational standards required in the proposed regulation; and 5) the exemption of small businesses from all or any part of the requirements contained in the proposed regulation.

There is no apparent alternative method that minimizes adverse impact while still accomplishing the intended positive policy goals. The proposal will have no impact regarding simplification or consolidation of reporting requirements. The Water Quality Standards Regulation is applicable statewide through Virginia Pollutant Discharge Elimination System (VPDES) permitted discharge limits for all businesses and entities that require such a permit. There are no clear alternative methods that would both comply with the Clean Water Act and cost less.

ATTACHMENT 1**Summary of Comment
Received during Notice of Public Comment Period
(September 18, 2017 – December 8, 2017)****Triennial Review – Remaining Issues****9VAC 25-260-140****Criteria for surface water**Commenters:

American Forest & Paper Association, Hampton Roads Sanitation District, National Council for Air and Stream Improvement, Inc., Virginia Manufacturers Association/Troutman Sanders LLP, West Rock, Virginia Coal and Energy Alliance, Inc.

Commenters expressed the opinion that there are substantial weaknesses with the assumptions (e.g., fish consumption rate, drinking water consumption rate, and relative source contribution factors) EPA used to derive the nationally recommended criteria for 94 human health pollutants. These commenters recommend that DEQ use alternative assumptions that are less conservative. Additionally, commenters recommended DEQ produce an estimate of potential costs.

Agency Response: EPA's updated criteria recommendations are based on science and policy that were vetted through a very extensive public process, including both external peer and stakeholder review. Because EPA proposed these updated criteria to the public and requested comments, it is EPA's view that these criteria have undergone review on a national level and no additional facts were presented during the review and comment periods that indicated to EPA any other alternate estimates for different exposure assumptions would be appropriate for these chemicals. DEQ lacks the resources to mobilize a multi-year process similar to that employed by EPA. The agency generally assumes that nationally recommended section 304(a) criteria are reasonably sound and scientifically defensible.

Although DEQ has not estimated the potential costs to dischargers that would be caused by the updated criteria, DEQ does not believe that costs will be substantial statewide since the majority of the affected pollutants are uncommon and discharger-specific. The Water Quality Standards Regulation (40 C.F.R. §131) provides states with multiple options when the costs of complying with WQS are proven to be too burdensome. These options can be considered once the criteria are adopted and discharger/waterbody-specific costs are better understood. Fifty-seven of the criteria would become less stringent which may result in cost savings for some facilities.

Commenters:

Chesapeake Bay Foundation

The commenter expressed support for the proposed revision to the recreational bacteria standard.

Agency Response: DEQ acknowledges CBF's support for the bacteria criteria amendments.

Commenters:

Environmental Protection Agency Region III

Commenter requests that Virginia consider: 1) adopting EPA's 2015 updated criteria for 2,4,5-Trichlorophenoxy propionic acid (Silvex), and 2) revising the proposed bacteria standard so that it is consistent with EPA recommendations regarding duration and frequency of exceedence.

Agency Response: The omission of the updated criteria for Silvex from the regulatory proposal was an oversight that will be corrected prior to final adoption by the Virginia State Water Control Board (SWCB). Also, the updated bacteria criteria section will be revised so that it specifies a 90-day duration for assessment of the geometric mean and the statistical threshold value (STV). The proposed language will be edited to specify that the STV is not to be exceeded no more than 10% of the time.

Comment received on 9VAC25-260-170. (Bacteria) after February 21, 2018 Regulatory Advisory Panel meeting.

Commenter:

Virginia Association of Municipal Wastewater Agencies

Additional comments were received from VAMWA stating that permitting procedures should not be addressed in the Water Quality Standards Regulation. The better approach is to use the permit manual or guidance to allow facilities greater flexibility. They also stated that it is unnecessary to include a specific STV-based limit in VPDES permits on the basis that compliance with the GM is protective and that specific STV limits are impracticable.

Agency Response:

It is not unusual for the Water Quality Standards Regulation to include policy elements related to permitting. For example, 9 VAC 25-260-20 (General Criteria) deals with the use of mixing zone concepts in evaluating VPDES permit limits. DEQ's Water Permit staff has advised that we should establish in the regulation that VPDES compliance with the GM of 126 counts/100ml for *E.coli* or 35 counts/100ml for enterococci will be determined with monthly geometric means. This has been our historical approach and it is appropriate to specify this in regulation now that instream assessment periods up to 90 days may be used. Regarding use of the STV, staff agrees that implementation can be addressed in permit guidance rather than in the Regulation and this provision has been removed from the proposal.

ATTACHMENT 5

1 9VAC25-260-140. Criteria for surface water.

2 A. Instream water quality conditions shall not be acutely¹ or chronically² toxic except as
3 allowed in 9VAC25-260-20 B (mixing zones). The following are definitions of acute and chronic
4 toxicity conditions:

5 "Acute toxicity" means an adverse effect that usually occurs shortly after exposure to a
6 pollutant. Lethality to an organism is the usual measure of acute toxicity. Where death is not
7 easily detected, immobilization is considered equivalent to death.

8 "Chronic toxicity" means an adverse effect that is irreversible or progressive or occurs
9 because the rate of injury is greater than the rate of repair during prolonged exposure to a
10 pollutant. This includes low level, long-term effects such as reduction in growth or reproduction.

11 B. The following table is a list of numerical water quality criteria for specific parameters.

12 Table of Parameters^{6, 7}

PARAMETER CAS Number	USE DESIGNATION					
	AQUATIC LIFE				HUMAN HEALTH	
	FRESHWATER		SALTWATER		Public Water Supply ³	All Other Surface Waters ⁴
	Acute ¹	Chronic ²	Acute ¹	Chronic ²		
Acenaphthene (µg/l) 83329					670 <u>70</u>	990 <u>90</u>
Acrolein (µg/l) 107028					6.4 <u>3</u>	9.3 <u>400</u>
Acrylonitrile (µg/l) 107131 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .					0.54 <u>0.61</u>	2.5 <u>70</u>
Aldrin (µg/l) 309002 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .	3.0		1.3		0.00049 <u>0.00000</u> <u>77</u>	0.00050 <u>0.000007</u> <u>7</u>
Ammonia (µg/l) 766-41-7 Chronic criterion is a 30- day average concentration not to be exceeded more than once every three (3) years on the average.(see 9VAC25-260-155)						
Anthracene (µg/l) 120127					8,300 <u>300</u>	40,000 <u>400</u>
Antimony (µg/l) 7440360					5.6	640

ATTACHMENT 5

PARAMETER CAS Number	USE DESIGNATION					
	AQUATIC LIFE				HUMAN HEALTH	
	FRESHWATER		SALTWATER		Public Water Supply ³	All Other Surface Waters ⁴
	Acute ¹	Chronic ²	Acute ¹	Chronic ²		
Arsenic (µg/l) ⁵ 7440382	340	150	69	36	10	
Bacteria (see 9VAC25-260-160 and 170)						
Barium (µg/l) 7440393					2,000	
Benzene (µg/l) 71432 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵					22 <u>5.8</u>	510— <u>160</u>
Benzidine (µg/l) 92875 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵					0.00086 <u>0.0014</u>	0.0020 <u>0.11</u>
Benzo (a) anthracene (µg/l) 56553 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵					0.038 <u>0.012</u>	0.18 <u>0.013</u>
Benzo (b) fluoranthene (µg/l) 205992 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵					0.038 <u>0.012</u>	0.18 <u>0.013</u>
Benzo (k) fluoranthene (µg/l) 207089 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵					0.038 <u>0.12</u>	0.18 <u>0.13</u>
Benzo (a) pyrene (µg/l) 50328 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵					0.038 <u>0.0012</u>	0.18 <u>0.0013</u>

ATTACHMENT 5

PARAMETER CAS Number	USE DESIGNATION					
	AQUATIC LIFE				HUMAN HEALTH	
	FRESHWATER		SALTWATER		Public Water Supply ³	All Other Surface Waters ⁴
	Acute ¹	Chronic ²	Acute ¹	Chronic ²		
Bis2-Chloroethyl Ether 111444 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵					0.30	5.3 <u>22</u>
<u>Bis (chloromethyl) Ether</u> <u>542881</u> <u>Known or suspected</u> <u>carcinogen; human health</u> <u>criteria at risk level 10⁻⁵</u>					<u>0.0015</u>	<u>0.17</u>
Bis2-Chloroisopropyl Ether (<u>Bis (2-Chloro-1-</u> <u>methylethyl) Ether</u>) (µg/l) 108601					1,400 <u>200</u>	65,000 <u>4,000</u>
Bis2-Ethylhexyl Phthalate (µg/l) 117817 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ . Synonym = Di-2- Ethylhexyl Phthalate.					42 <u>3.2</u>	22 <u>3.7</u>
Bromoform (µg/l) 75252 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .					43 <u>70</u>	1,400 <u>1,200</u>
Butyl benzyl phthalate (µg/l) 85687					1,500 <u>[0.10]</u> <u>[1.0]</u>	1,900 <u>[0.10]</u> <u>[1.0]</u>

ATTACHMENT 5

PARAMETER CAS Number	USE DESIGNATION					
	AQUATIC LIFE				HUMAN HEALTH	
	FRESHWATER		SALTWATER		Public Water Supply ³	All Other Surface Waters ⁴
	Acute ¹	Chronic ²	Acute ¹	Chronic ²		
Cadmium (µg/l) ⁵ 7440439 Freshwater values are a function of total hardness as calcium carbonate (CaCO ₃) mg/l and the WER. The minimum hardness allowed for use in the equation below shall be 25 and the maximum hardness shall be 400 even when the actual ambient hardness is less than 25 or greater than 400. Freshwater acute criterion (µg/l) $\text{WER} = e^{\frac{(1.128[\ln(\text{hardness})] - 3.828)}{(0.9789[\ln(\text{hardness})] - 3.866)}} (CF_a)$ Freshwater chronic criterion (µg/l) $\text{WER} = e^{\frac{(0.7852[\ln(\text{hardness})] - 3.490)}{(0.7977[\ln(\text{hardness})] - 3.909)}} (CF_c)$ WER = Water Effect Ratio = 1 unless determined otherwise under 9VAC25-260-140 F e = natural antilogarithm ln = natural logarithm CF = conversion factor a (acute) or c (chronic) $CF_a = 1.136672 - [(\ln \text{hardness})(0.041838)]$ $CF_c = 1.101672 - [(\ln \text{hardness})(0.041838)]$	3.9 <u>1.8</u> CaCO ₃ = 100	4.4 <u>0.72</u> CaCO ₃ = 100	40 <u>33</u> X WER	8.8 <u>7.9</u> X WER	5	
Carbon tetrachloride (µg/l) 56235 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .					2.3 <u>4.0</u>	16 <u>50</u>

ATTACHMENT 5

PARAMETER CAS Number	USE DESIGNATION					
	AQUATIC LIFE				HUMAN HEALTH	
	FRESHWATER		SALTWATER		Public Water Supply ³	All Other Surface Waters ⁴
	Acute ¹	Chronic ²	Acute ¹	Chronic ²		
Chlordane (µg/l) 57749 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .	2.4	0.0043	0.09	0.0040	0.0080 <u>0.0031</u>	0.0081 <u>0.0032</u>
Chloride (µg/l) 16887006 Human Health criterion to maintain acceptable taste and aesthetic quality and applies at the drinking water intake. Chloride criteria do not apply in Class II transition zones (see subsection C of this section).	860,000	230,000			250,000	
Chlorine, Total Residual (µg/l) 7782505 In DGIF class i and ii trout waters (9VAC25-260-390 through 9VAC25-260-540) or waters with threatened or endangered species are subject to the halogen ban (9VAC25-260-110).	19 See 9VAC25 -260- 110	11 See 9VAC25 -260-110				
Chlorine Produced Oxidant (µg/l) 7782505			13	7.5		
Chlorobenzene (µg/l) 108907					130 <u>100</u>	1,600 <u>800</u>
Chlorodibromomethane (µg/l) 124481 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .					4.0 <u>8.0</u>	130 <u>210</u>
Chloroform (µg/l) 67663					340 <u>60</u>	11,000 <u>2,000</u>
2-Chloronaphthalene (µg/l) 91587					1,000 <u>800</u>	1,600 <u>1,000</u>

ATTACHMENT 5

PARAMETER CAS Number	USE DESIGNATION					
	AQUATIC LIFE				HUMAN HEALTH	
	FRESHWATER		SALTWATER		Public Water Supply ³	All Other Surface Waters ⁴
	Acute ¹	Chronic ²	Acute ¹	Chronic ²		
2-Chlorophenol (µg/l) 95578					84 <u>30</u>	450 <u>800</u>
Chlorpyrifos (µg/l) 2921882	0.083	0.041	0.011	0.0056		
Chromium III (µg/l) ⁵ 16065831 Freshwater values are a function of total hardness as calcium carbonate CaCO ₃ mg/l and the WER. The minimum hardness allowed for use in the equation below shall be 25 and the maximum hardness shall be 400 even when the actual ambient hardness is less than 25 or greater than 400. Freshwater acute criterion µg/l WER $[e^{(0.8190[\ln(\text{hardness})]+3.7256]}]$ (CF _a) Freshwater chronic criterion µg/l WER $[e^{(0.8190[\ln(\text{hardness})]+0.6848]}]$ (CF _c) WER = Water Effect Ratio = 1 unless determined otherwise under 9VAC25-260-140.F e = natural antilogarithm ln=natural logarithm CF = conversion factor a (acute) or c (chronic) CF _a = 0.316 CF _c =0.860	570 (CaCO ₃ = 100)	74 (CaCO ₃ = 100)			100 (total Cr)	
Chromium VI (µg/l) ⁵ 18540299	16	11	1,100	50		

ATTACHMENT 5

PARAMETER CAS Number	USE DESIGNATION					
	AQUATIC LIFE				HUMAN HEALTH	
	FRESHWATER		SALTWATER		Public Water Supply ³	All Other Surface Waters ⁴
	Acute ¹	Chronic ²	Acute ¹	Chronic ²		
Chrysene (µg/l) 218019 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .					0.0038 <u>1.2</u>	0.018 <u>1.3</u>
Copper (µg/l) ⁵ 7440508 Freshwater values are a function of total hardness as calcium carbonate CaCO ₃ mg/l and the WER. The minimum hardness allowed for use in the equation below shall be 25 and the maximum hardness shall be 400 even when the actual ambient hardness is less than 25 or greater than 400. Freshwater acute criterion (µg/l) WER [e ^{$\frac{0.9422[\ln(\text{hardness})]}{1.700}$}] (CF _a) Freshwater chronic criterion (µg/l) WER [e ^{$\frac{0.8545[\ln(\text{hardness})]}{1.702}$}] (CF _c) WER = Water Effect Ratio = 1 unless determined otherwise under 9VAC25- 260-140 F. e = natural antilogarithm ln=natural logarithm CF = conversion factor a (acute) or c (chronic) CF _a = 0.960 CF _c = 0.960 Acute saltwater criterion is a 24-hour average not to be exceeded more than once every three years on the average.	13 CaCO ₃ = 100	9.0 CaCO ₃ = 100	9.3 X WER	6.0 X WER	1,300	

ATTACHMENT 5

PARAMETER CAS Number	USE DESIGNATION					
	AQUATIC LIFE				HUMAN HEALTH	
	FRESHWATER		SALTWATER		Public Water Supply ³	All Other Surface Waters ⁴
	Acute ¹	Chronic ²	Acute ¹	Chronic ²		
Cyanide, Free (µg/l) 57125	22	5.2	1.0	1.0	140– 4	16,000 400
DDD (µg/l) 72548 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .					0.0031 <u>0.0012</u>	0.0031 <u>0.0012</u>
DDE (µg/l) 72559 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .					0.0022 <u>0.00018</u>	0.0022 <u>0.00018</u>
DDT (µg/l) 50293 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ . Total concentration of DDT and metabolites shall not exceed aquatic life criteria.	1.1	0.0010	0.13	0.0010	0.0022 <u>0.00030</u>	0.0022 <u>0.00030</u>
Demeton (µg/l) 8065483		0.1		0.1		
Diazinon (µg/l) 333415	0.17	0.17	0.82	0.82		
Dibenz (a, h) anthracene (µg/l) 53703 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .					0.038 <u>0.0012</u>	0.18 <u>0.0013</u>
1,2-Dichlorobenzene (µg/l) 95501					420 <u>1,000</u>	1,300 <u>3,000</u>
1,3- Dichlorobenzene (µg/l) 541731					320 7	960 10
1,4 Dichlorobenzene (µg/l) 106467					63 <u>300</u>	190 <u>900</u>

ATTACHMENT 5

PARAMETER CAS Number	USE DESIGNATION					
	AQUATIC LIFE				HUMAN HEALTH	
	FRESHWATER		SALTWATER		Public Water Supply ³	All Other Surface Waters ⁴
	Acute ¹	Chronic ²	Acute ¹	Chronic ²		
3,3 Dichlorobenzidine 91941 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .					0.21 <u>0.49</u>	0.28 <u>1.5</u>
Dichlorobromomethane (µg/l) 75274 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .					5.5 <u>9.5</u>	170 <u>270</u>
1,2 Dichloroethane (µg/l) 107062 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .					3.8 <u>99</u>	370 <u>6,500</u>
1,1 Dichloroethylene (µg/l) 75354					330 <u>300</u>	7,100 <u>20,000</u>
1,2-trans-dichloroethylene (µg/l) 156605					140 <u>100</u>	10,000 <u>4,000</u>
2,4 Dichlorophenol (µg/l) 120832					77 <u>10</u>	290 <u>60</u>
2,4 Dichlorophenoxy acetic acid (Chlorophenoxy Herbicide) (2,4-D) (µg/l) 94757					400 <u>1,300</u>	<u>12,000</u>
1,2-Dichloropropane (µg/l) 78875 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .					5.0 <u>9.0</u>	450 <u>310</u>
1,3-Dichloropropene (µg/l) 542756 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .					3.4 <u>2.7</u>	210 <u>120</u>

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PARAMETER CAS Number	USE DESIGNATION					
	AQUATIC LIFE				HUMAN HEALTH	
	FRESHWATER		SALTWATER		Public Water Supply ³	All Other Surface Waters ⁴
	Acute ¹	Chronic ²	Acute ¹	Chronic ²		
Dieldrin (µg/l) 60571 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .	0.24	0.056	0.71	0.0019	0.00052 <u>0.00001</u> 2	0.00054 <u>0.000012</u>
Diethyl Phthalate (µg/l) 84662					17,000 <u>600</u>	44,000 <u>600</u>
2,4 Dimethylphenol (µg/l) 105679					380 <u>100</u>	850 <u>3,000</u>
Dimethyl Phthalate (µg/l) 131113					270,000 <u>2,000</u>	1,100,000 <u>2,000</u>
Di-n-Butyl Phthalate (µg/l) 84742					2,000 <u>20</u>	4,500 30
2,4 Dinitrophenol (µg/l) 51285					60 10	5,300 <u>300</u>
<u>Dinitrophenols (µg/l)</u> <u>25550587</u>					10	1,000
2-Methyl-4,6-Dinitrophenol (µg/l) 534521					43 2	280 30
2,4 Dinitrotoluene (µg/l) 121142 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵					4.4 <u>0.49</u>	34 17
Dioxin 2, 3, 7, 8- tetrachlorodibenzo-p- dioxin (µg/l) 1746016					5.0 E-8	5.1 E-8
1,2-Diphenylhydrazine (µg/l) 122667 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵					0.36 <u>0.3</u>	2.0
Dissolved Oxygen (µg/l) (See 9VAC25-260-50)						

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PARAMETER CAS Number	USE DESIGNATION					
	AQUATIC LIFE				HUMAN HEALTH	
	FRESHWATER		SALTWATER		Public Water Supply ³	All Other Surface Waters ⁴
	Acute ¹	Chronic ²	Acute ¹	Chronic ²		
Alpha-Endosulfan (µg/l) 959988 Total concentration alpha and beta-endosulfan shall not exceed aquatic life criteria.	0.22	0.056	0.034	0.0087	62 <u>20</u>	89 <u>30</u>
Beta-Endosulfan (µg/l) 33213659 Total concentration alpha and beta-endosulfan shall not exceed aquatic life criteria.	0.22	0.056	0.034	0.0087	62 <u>20</u>	89 <u>40</u>
Endosulfan Sulfate (µg/l) 1031078					62 <u>20</u>	89 <u>40</u>
Endrin (µg/l) 72208	0.086	0.036	0.037	0.0023	0.059 <u>0.03</u>	0.060 <u>0.03</u>
Endrin Aldehyde (µg/l) 7421934					0.29 <u>1</u>	0.30 <u>1</u>
Ethylbenzene (µg/l) 100414					530 <u>68</u>	2,100 <u>130</u>
Fecal Coliform (see 9VAC25-260-160)						
Fluoranthene (µg/l) 206440					130 <u>20</u>	140 <u>20</u>
Fluorene (µg/l) 86737					1,100 <u>50</u>	5,300 <u>70</u>
Foaming Agents (µg/l) Criterion measured as methylene blue active substances. Criterion to maintain acceptable taste, odor, or aesthetic quality of drinking water and applies at the drinking water intake.					500	
Guthion (µg/l) 86500		0.01		0.01		

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PARAMETER CAS Number	USE DESIGNATION					
	AQUATIC LIFE				HUMAN HEALTH	
	FRESHWATER		SALTWATER		Public Water Supply ³	All Other Surface Waters ⁴
	Acute ¹	Chronic ²	Acute ¹	Chronic ²		
Heptachlor (µg/l) 76448 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .	0.52	0.0038	0.053	0.0036	0.00079 <u>0.00005</u> 9	0.00079 <u>0.000059</u>
Heptachlor Epoxide (µg/l) 1024573 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .	0.52	0.0038	0.053	0.0036	0.00039 <u>0.00032</u>	0.00039 <u>0.00032</u>
Hexachlorobenzene (µg/l) 118741 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .					0.0028 <u>0.00079</u>	0.0029 <u>0.00079</u>
Hexachlorobutadiene (µg/l) 87683 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .					4.4 <u>0.1</u>	180 <u>0.1</u>
Hexachlorocyclohexane Alpha-BHC (µg/l) 319846 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .					0.026 <u>0.0036</u>	0.049 <u>0.0039</u>
Hexachlorocyclohexane Beta-BHC (µg/l) 319857 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .					0.094 <u>0.080</u>	0.17 <u>0.14</u>
Hexachlorocyclohexane (µg/l) (Lindane) Gamma-BHC 58899 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .	0.95		0.16		0.98 <u>4.2</u>	1.8 <u>4.4</u>

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PARAMETER CAS Number	USE DESIGNATION					
	AQUATIC LIFE				HUMAN HEALTH	
	FRESHWATER		SALTWATER		Public Water Supply ³	All Other Surface Waters ⁴
	Acute ¹	Chronic ²	Acute ¹	Chronic ²		
Hexachlorocyclohexane (HCH)-Technical (µg/l) 608731 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .					0.066	0.1
Hexachlorocyclopentadiene (µg/l) 77474					40 4	1,100 4
Hexachloroethane (µg/l) 67721 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .					14 1	33 1
Hydrogen sulfide (µg/l) 7783064		2.0		2.0		
Indeno (1,2,3,-cd) pyrene (µg/l) 193395 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .					0.038 0.012	0.18 0.013
Iron (µg/l) 7439896 Criterion to maintain acceptable taste, odor or aesthetic quality of drinking water and applies at the drinking water intake.					300	
Isophorone (µg/l) 78591 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .					350 340	9,600 18,000
Kepone (µg/l) 143500		zero		zero		

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PARAMETER CAS Number	USE DESIGNATION					
	AQUATIC LIFE				HUMAN HEALTH	
	FRESHWATER		SALTWATER		Public Water Supply ³	All Other Surface Waters ⁴
	Acute ¹	Chronic ²	Acute ¹	Chronic ²		
Lead (µg/l) ⁵ 7439921 Freshwater values are a function of total hardness as calcium carbonate CaCO ₃ mg/l and the water effect ratio. The minimum hardness allowed for use in the equation below shall be 25 and the maximum hardness shall be 400 even when the actual ambient hardness is less than 25 or greater than 400. Freshwater acute criterion (µg/l) WER [e ^{1.273[ln(hardness)]-1.084}] Freshwater chronic criterion (µg/l) WER [e ^{1.273[ln(hardness)]-3.259}] WER = Water Effect Ratio = 1 unless determined otherwise under 9VAC25-260-140 F e = natural antilogarithm ln = natural logarithm	120 CaCO ₃ = 100	14 CaCO ₃ = 100	240 X WER	9.3 X WER	15	
Malathion (µg/l) 121755		0.1		0.1		
Manganese (µg/l) 7439965 Criterion to maintain acceptable taste, odor or aesthetic quality of drinking water and applies at the drinking water intake.					50	
Mercury (µg/l) ⁵ 7439976	1.4	0.77	1.8	0.94		
Methyl Bromide (µg/l) 74839					47 <u>100</u>	<u>1,500</u> <u>10,000</u>

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PARAMETER CAS Number	USE DESIGNATION					
	AQUATIC LIFE				HUMAN HEALTH	
	FRESHWATER		SALTWATER		Public Water Supply ³	All Other Surface Waters ⁴
	Acute ¹	Chronic ²	Acute ¹	Chronic ²		
<u>3-Methyl-4-Chlorophenol</u> 59507					<u>500</u>	<u>2,000</u>
Methyl Mercury (Fish Tissue Criterion mg/kg) ⁸ 22967926					0.30	0.30
Methylene Chloride (µg/l) 75092 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ Synonym = Dichloromethane					46 <u>20</u>	5,900 <u>1,000</u>
Methoxychlor (µg/l) 72435		0.03		0.03	100 <u>0.02</u>	<u>0.02</u>
Mirex (µg/l) 2385855		zero		zero		

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PARAMETER CAS Number	USE DESIGNATION					
	AQUATIC LIFE				HUMAN HEALTH	
	FRESHWATER		SALTWATER		Public Water Supply ³	All Other Surface Waters ⁴
	Acute ¹	Chronic ²	Acute ¹	Chronic ²		
Nickel (µg/l) ⁵ 744002 Freshwater values are a function of total hardness as calcium carbonate CaCO ₃ mg/l and the WER. The minimum hardness allowed for use in the equation below shall be 25 and the maximum hardness shall be 400 even when the actual ambient hardness is less than 25 or greater than 400. Freshwater acute criterion µg/l $WER [e^{(0.8460[\ln(\text{hardness})] + 1.312)}] (CF_a)$ Freshwater chronic criterion (µg/l) $WER [e^{(0.8460[\ln(\text{hardness})] - 0.8840)}] (CF_c)$ WER = Water Effect Ratio = 1 unless determined otherwise under 9VAC25-260-140 F e = natural antilogarithm ln = natural logarithm CF = conversion factor a (acute) or c (chronic) CF _a = 0.998 CF _c = 0.997	180 CaCO ₃ = 100	20 CaCO ₃ = 100	74 X WER	8.2 X WER	610	4,600
Nitrate as N (µg/l) 14797558					10,000	
Nitrobenzene (µg/l) 98953					47 <u>10</u>	690 <u>600</u>
N-Nitrosodimethylamine (µg/l) 62759 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .					0.0069	30

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PARAMETER CAS Number	USE DESIGNATION					
	AQUATIC LIFE				HUMAN HEALTH	
	FRESHWATER		SALTWATER		Public Water Supply ³	All Other Surface Waters ⁴
	Acute ¹	Chronic ²	Acute ¹	Chronic ²		
N-Nitrosodiphenylamine (µg/l) 86306 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .					33	160 60
N-Nitrosodi-n-propylamine (µg/l) 621647 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .					0.050	5.1
Nonylphenol 1044051	28	6.6	7.0	1.7		
Parathion (µg/l) 56382	0.065	0.013				
PCB Total (µg/l) 1336363 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵		0.014		0.030	0.00064	0.00064
Pentachlorobenzene (µg/l) 608935					<u>0.1</u>	<u>0.1</u>
Pentachlorophenol (µg/l) 87865 Known or suspected carcinogen; human health criteria risk level at 10 ⁻⁵ Freshwater acute criterion (µg/l) e ^{(1.005(pH)-4.869)} Freshwater chronic criterion (µg/l) e ^{(1.005(pH)-5.134)}	8.7 pH = 7.0	6.7 pH = 7.0	13	7.9	2.7 <u>0.3</u>	30 <u>0.4</u>
pH See 9VAC25-260-50						
Phenol (µg/l) 108952					40,000 <u>4,000</u>	860,000 <u>300,000</u>

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PARAMETER CAS Number	USE DESIGNATION					
	AQUATIC LIFE				HUMAN HEALTH	
	FRESHWATER		SALTWATER		Public Water Supply ³	All Other Surface Waters ⁴
	Acute ¹	Chronic ²	Acute ¹	Chronic ²		
Phosphorus Elemental (µg/l) 7723140				0.10		
Pyrene (µg/l) 129000					830 <u>20</u>	4,000 <u>30</u>
Radionuclides Gross Alpha Particle Activity (pCi/L) Beta Particle & Photon Activity (mrem/yr) (formerly man-made radionuclides) Combined Radium 226 and 228 (pCi/L) Uranium (µg/L)					15 4 5 30	
Selenium (µg/l) ⁵ 7782492 WER shall not be used for freshwater acute and chronic criteria. Freshwater criteria expressed as total recoverable.	20	5.0	290 X WER	71 X WER	170	4,200

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PARAMETER CAS Number	USE DESIGNATION					
	AQUATIC LIFE				HUMAN HEALTH	
	FRESHWATER		SALTWATER		Public Water Supply ³	All Other Surface Waters ⁴
	Acute ¹	Chronic ²	Acute ¹	Chronic ²		
Silver (µg/l) ⁵ 7440224 Freshwater values are a function of total hardness as calcium carbonate (CaCO ₃) mg/l and the WER. The minimum hardness allowed for use in the equation below shall be 25 and the maximum hardness shall be 400 even when the actual ambient hardness is less than 25 or greater than 400. Freshwater acute criterion (µg/l) WER $[e^{\{1.72[\ln(\text{hardness})]-6.52\}}]$ (CF _a) WER = Water Effect Ratio = 1 unless determined otherwise under 9VAC25-260-140 F e = natural antilogarithm ln=natural logarithm CF = conversion factor a (acute) or c (chronic) CF _a = 0.85	3.4; CaCO ₃ = 100		1.9 X WER			
Sulfate (µg/l) Criterion to maintain acceptable taste, odor or aesthetic quality of drinking water and applies at the drinking water intake.					250,000	
Temperature See 9VAC25-260-50						
<u>1,2,4,5-Tetrachlorobenzene</u> <u>95943</u>					<u>0.03</u>	<u>0.03</u>

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PARAMETER CAS Number	USE DESIGNATION					
	AQUATIC LIFE				HUMAN HEALTH	
	FRESHWATER		SALTWATER		Public Water Supply ³	All Other Surface Waters ⁴
	Acute ¹	Chronic ²	Acute ¹	Chronic ²		
1,1,2,2-Tetrachloroethane (µg/l) 79345 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵)					4.7 <u>2.0</u>	40 <u>30</u>
Tetrachloroethylene (µg/l) 127184 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵)					6.9 <u>100</u>	33 <u>290</u>
Thallium (µg/l) 7440280					0.24	0.47
Toluene (µg/l) 108883					540 <u>57</u>	6,000 <u>520</u>
Total Dissolved Solids (µg/l) Criterion to maintain acceptable taste, odor or aesthetic quality of drinking water and applies at the drinking water intake.					500,000	
Toxaphene (µg/l) 8001352 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .	0.73	0.0002	0.21	0.0002	0.0028 <u>0.0070</u>	0.0028 <u>0.0071</u>
Tributyltin (µg/l) 60105	0.46	0.072	0.42	0.0074		
1, 2, 4 Trichlorobenzene (µg/l) 120821 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .					35 <u>0.71</u>	70 <u>0.76</u>
<u>1,1,1-Trichloroethane</u> <u>71556</u>					<u>10,000</u>	<u>200,000</u>

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PARAMETER CAS Number	USE DESIGNATION					
	AQUATIC LIFE				HUMAN HEALTH	
	FRESHWATER		SALTWATER		Public Water Supply ³	All Other Surface Waters ⁴
	Acute ¹	Chronic ²	Acute ¹	Chronic ²		
1,1,2-Trichloroethane (µg/l) 79005 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .					5.9 <u>5.5</u>	160 <u>89</u>
Trichloroethylene (µg/l) 79016 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .					25 <u>6.0</u>	300 <u>70</u>
<u>2, 4, 5 –Trichlorophenol</u> <u>95954</u>					<u>300</u>	<u>600</u>
2, 4, 6 –Trichlorophenol 88062 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .					14 <u>15</u>	24 <u>28</u>
2–(2, 4, 5 – Trichlorophenoxy propionic acid[<u>]] (Silvex) (µg/l) 93721</u>					[50] [<u>100</u>]	[<u>400</u>]
Vinyl Chloride (µg/l) 75014 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .					0.25 <u>0.22</u>	24 <u>16</u>

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PARAMETER CAS Number	USE DESIGNATION					
	AQUATIC LIFE				HUMAN HEALTH	
	FRESHWATER		SALTWATER		Public Water Supply ³	All Other Surface Waters ⁴
	Acute ¹	Chronic ²	Acute ¹	Chronic ²		
Zinc (µg/l) ⁵ 744066 Freshwater values are a function of total hardness as calcium carbonate (CaCO ₃) mg/l and the WER. The minimum hardness allowed for use in the equation below shall be 25 and the maximum, hardness shall be 400 even when the actual ambient hardness is less than 25 or greater than 400. Freshwater acute criterion µg/l WER $[e^{\{0.8473[\ln(\text{hardness})]+0.884\}}]$ (CF _a) Freshwater chronic criterion µg/l WER $[e^{\{0.8473[\ln(\text{hardness})]+0.884\}}]$ (CF _c) WER = Water Effect Ratio = 1 unless determined otherwise under 9VAC25-260-140 F e = base e exponential function. ln = log normal function CF _a = 0.978 CF _c = 0.986	120 CaCO ₃ = 100	120 CaCO ₃ = 100	90 X WER	81 X WER	7,400	26,000

13 ¹One hour average concentration not to be exceeded more than once every 3 years on the
 14 average, unless otherwise noted.

15 ²Four-day average concentration not to be exceeded more than once every 3 years on the
 16 average, unless otherwise noted.

17 ³Criteria have been calculated to protect human health from toxic effects through drinking
 18 water and fish consumption, unless otherwise noted and apply in segments designated as
 19 PWS in 9VAC25-260-390-540.

20 ⁴Criteria have been calculated to protect human health from toxic effects through fish
 21 consumption, unless otherwise noted and apply in all other surface waters not designated as
 22 PWS in 9VAC25-260-390-540.

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⁵Acute and chronic saltwater and freshwater aquatic life criteria apply to the biologically available form of the metal and apply as a function of the pollutant's water effect ratio (WER) as defined in 9VAC25-260-140 F (WER X criterion). Metals measured as dissolved shall be considered to be biologically available, or, because local receiving water characteristics may otherwise affect the biological availability of the metal, the biologically available equivalent measurement of the metal can be further defined by determining a Water Effect Ratio (WER) and multiplying the numerical value shown in 9VAC25-260-140 B by the WER. Refer to 9VAC25-260-140 F. Values displayed above in the table are examples and correspond to a WER of 1.0. Metals criteria have been adjusted to convert the total recoverable fraction to dissolved fraction using a conversion factor. Criteria that change with hardness have the conversion factor listed in the table above.

⁶The flows listed below are default design flows for calculating steady state waste load allocations unless statistically valid methods are employed which demonstrate compliance with the duration and return frequency of the water quality criteria.

Aquatic Life:

Acute criteria	1Q10
Chronic criteria	7Q10
Chronic criteria (ammonia)	30Q10

Human Health:

Noncarcinogens	30Q5
Carcinogens	Harmonic mean

The following are defined for this section:

"1Q10" means the lowest flow averaged over a period of one day which on a statistical basis can be expected to occur once every 10 climatic years.

"7Q10" means the lowest flow averaged over a period of seven consecutive days that can be statistically expected to occur once every 10 climatic years.

"30Q5" means the lowest flow averaged over a period of 30 consecutive days that can be statistically expected to occur once every five climatic years.

"30Q10" means the lowest flow averaged over a period of 30 consecutive days that can be statistically expected to occur once every 10 climatic years.

"Averaged" means an arithmetic mean.

"Climatic year" means a year beginning on April 1 and ending on March 31.

⁷The criteria listed in this table are two significant digits. For other criteria that are referenced to other sections of this regulation in this table, all numbers listed as criteria values are significant.

⁸The fish tissue criterion for methylmercury applies to a concentration of 0.30 mg/kg as wet weight in edible tissue for species of fish and/or shellfish resident in a waterbody that are commonly eaten in the area and have commercial, recreational, or subsistence value.

C. Application of freshwater and saltwater numerical criteria. The numerical water quality criteria listed in subsection B of this section (excluding dissolved oxygen, pH, temperature) shall be applied according to the following classes of waters (see 9VAC25-260-50) and boundary designations:

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CLASS OF WATERS	NUMERICAL CRITERIA
I and II (Estuarine Waters)	Saltwater criteria apply
II (Transition Zone)	More stringent of either the freshwater or saltwater criteria apply
II (Tidal Freshwater), III, IV, V, VI and VII	Freshwater criteria apply

61

62 The following describes the boundary designations for Class II, (estuarine, transition zone
63 and tidal freshwater waters) by river basin:

64 1. Rappahannock Basin. Tidal freshwater is from the fall line of the Rappahannock River
65 to the upstream boundary of the transition zone including all tidal tributaries that enter
66 the tidal freshwater Rappahannock River.

67 Transition zone upstream boundary – 38° 4' 56.59"/-76° 58' 47.93" (430 feet east of
68 Hutchinson Swamp) to 38° 5' 23.33"/-76° 58' 24.39" (0.7 miles upstream of Peedee
69 Creek).

70 Transition zone downstream boundary - 37° 58' 45.80"/-76° 55' 28.75" (1,000 feet
71 downstream of Jenkins Landing) to 37° 59' 20.07/ -76° 53' 45.09" (0.33 miles upstream
72 of Mulberry Point). All tidal waters that enter the transition zone are themselves transition
73 zone waters.

74 Estuarine waters are from the downstream boundary of the transition zone to the mouth
75 of the Rappahannock River (Buoy 6), including all tidal tributaries that enter the
76 estuarine waters of the Rappahannock River.

77 2. York Basin. Tidal freshwater is from the fall line of the Mattaponi River at N37° 47'
78 20.03"/W77° 6' 15.16" (800 feet upstream of the Route 360 bridge in Aylett) to the
79 upstream boundary of the Mattaponi River transition zone, and from the fall line of the
80 Pamunkey River at N37° 41' 22.64" /W77° 12' 50.83" (2,000 feet upstream of
81 Totopotomy Creek) to the upstream boundary of the Pamunkey River transition zone,
82 including all tidal tributaries that enter the tidal freshwaters of the Mattaponi and
83 Pamunkey Rivers.

84 Mattaponi River transition zone upstream boundary – N37° 39' 29.65"/W76° 52' 53.29"
85 (1,000 feet upstream of Mitchell Hill Creek) to N37° 39' 24.20"/W76° 52' 55.87" (across
86 from Courthouse Landing). Mattaponi River transition zone downstream boundary –
87 N37° 32' 19.76"/W76° 47' 29.41" (old Lord Delaware Bridge, west side) to N37° 32'
88 13.25"/W76° 47' 10.30" (old Lord Delaware Bridge, east side).

89 Pamunkey River transition zone upstream boundary – N37° 32' 36.63"/W76° 58' 29.88"
90 (Cohoke Marsh, 0.9 miles upstream of Turkey Creek) to N37° 32' 36.51"/W76° 58'
91 36.48" (0.75 miles upstream of creek at Cook Landing). Pamunkey River transition zone
92 downstream boundary – N37° 31' 57.90"/ 76° 48' 38.22" (old Eltham Bridge, west side)
93 to N37° 32' 6.25"/W76 48' 18.82" (old Eltham Bridge, east side).

94 All tidal tributaries that enter the transition zones of the Mattaponi and Pamunkey Rivers
95 are themselves in the transition zone.

96 Estuarine waters are from the downstream boundary of the transition zones of the
97 Mattaponi and Pamunkey Rivers to the mouth of the York River (Tue Marsh Light)
98 including all tidal tributaries that enter the estuarine waters of the York River.

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3. James Basin. Tidal Freshwater is from the fall line of the James River in the City of Richmond upstream of Mayo Bridge to the upstream boundary of the transition zone, including all tidal tributaries that enter the tidal freshwater James River.

James River transition zone upstream boundary – N37° 14' 28.25"/W76° 56' 44.47" (at Tettington) to N37° 13' 38.56"/W76° 56' 47.13" 0.3 miles downstream of Sloop Point.

Chickahominy River transition zone upstream boundary – N37° 25' 44.79"/W77° 1' 41.76" (Holly Landing).

Transition zone downstream boundary – N37° 12' 7.23"/W76° 37' 34.70" (near Carters Grove Home, 1.25 downstream of Grove Creek) to N37° 9' 17.23"/W76° 40' 13.45" (0.7 miles upstream of Hunnicutt Creek). All tidal waters that enter the transition zone are themselves transition zone waters.

Estuarine waters are from the downstream transition zone boundary to the mouth of the James River (Buoy 25) including all tidal tributaries that enter the estuarine waters of the James River.

4. Potomac Basin. Tidal Freshwater includes all tidal tributaries that enter the Potomac River from its fall line at the Chain Bridge (N38° 55' 46.28"/W77° 6' 59.23") to the upstream transition zone boundary near Quantico, Virginia.

Transition zone includes all tidal tributaries that enter the Potomac River from N38° 31' 27.05"/W77° 17' 7.06" (midway between Shipping Point and Quantico Pier) to N38° 23' 22.78"/W77° 1' 45.50" (one mile southeast of Mathias Point).

Estuarine waters includes all tidal tributaries that enter the Potomac River from the downstream transition zone boundary to the mouth of the Potomac River (Buoy 44B).

5. Chesapeake Bay, Atlantic Ocean, and small coastal basins. Estuarine waters include the Atlantic Ocean tidal tributaries, and the Chesapeake Bay and its small coastal basins from the Virginia state line to the mouth of the bay (a line from Cape Henry drawn through Buoys 3 and 8 to Fishermans Island), and its tidal tributaries, excluding the Potomac tributaries and those tributaries listed above.

6. Chowan River Basin. Tidal freshwater includes the Northwest River and its tidal tributaries from the Virginia-North Carolina state line to the free flowing portion, the Blackwater River and its tidal tributaries from the Virginia-North Carolina state line to the end of tidal waters at approximately state route 611 at river mile 20.90, the Nottoway River and its tidal tributaries from the Virginia-North Carolina state line to the end of tidal waters at approximately Route 674, and the North Landing River and its tidal tributaries from the Virginia-North Carolina state line to the Great Bridge Lock.

Transition zone includes Back Bay and its tributaries in the City of Virginia Beach to the Virginia-North Carolina state line.

D. Site-specific modifications to numerical water quality criteria.

1. The board may consider site-specific modifications to numerical water quality criteria in subsection B of this section where the applicant or permittee demonstrates that the alternate numerical water quality criteria are sufficient to protect all designated uses (see 9VAC25-260-10) of that particular surface water segment or body.

2. Any demonstration for site-specific human health criteria shall be restricted to a reevaluation of the bioconcentration or bioaccumulation properties of the pollutant. The exceptions to this restriction are for site-specific criteria for taste, odor, and aesthetic compounds noted by double asterisks in subsection B of this section and nitrates.

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3. Procedures for promulgation and review of site-specific modifications to numerical water quality criteria resulting from subdivisions 1 and 2 of this subsection.

a. Proposals describing the details of the site-specific study shall be submitted to the board's staff for approval prior to commencing the study.

b. Any site-specific modification shall be promulgated as a regulation in accordance with the Administrative Process Act. All site-specific modifications shall be listed in 9VAC25-260-310 (Special standards and requirements).

E. Variances to water quality standards.

1. A variance from numeric criteria may be granted to a discharger if it can be demonstrated that one or more of the conditions in 9VAC25-260-10 H limit the attainment of one or more specific designated uses.

a. Variances shall apply only to the discharger to whom they are granted and shall be reevaluated and either continued, modified or revoked at the time of permit issuance. At that time the permittee shall make a showing that the conditions for granting the variance still apply.

b. Variances shall be described in the public notice published for the permit. The decision to approve a variance shall be subject to the public participation requirements of the Virginia Pollutant Discharge Elimination System (VPDES) Permit Regulation, 9VAC25-31 (Permit Regulation).

c. Variances shall not prevent the maintenance and protection of existing uses or exempt the discharger or regulated activity from compliance with other appropriate technology or water quality-based limits or best management practices.

d. Variances granted under this section shall not apply to new discharges.

e. Variances shall be submitted by the department's Division of Scientific Research or its successors to the Environmental Protection Agency for review and approval/disapproval.

f. A list of variances granted shall be maintained by the department's Division of Scientific Research or its successors.

2. None of the variances in this subsection shall apply to the halogen ban section (9VAC25-260-110) or temperature criteria in 9VAC25-260-50 if superseded by § 316(a) of the Clean Water Act requirements. No variances in this subsection shall apply to the criteria that are designed to protect human health from carcinogenic and noncarcinogenic toxic effects (subsection B of this section) with the exception of the metals, and the taste, odor, and aesthetic compounds noted by double asterisks and nitrates, listed in subsection B of this section.

F. Water effect ratio.

1. A water effects ratio (WER) shall be determined by measuring the effect of receiving water (as it is or will be affected by any discharges) on the bioavailability or toxicity of a metal by using standard test organisms and a metal to conduct toxicity tests simultaneously in receiving water and laboratory water. The ratio of toxicities of the metal(s) in the two waters is the WER (toxicity in receiving water divided by toxicity in laboratory water = WER). Once an acceptable WER for a metal is established, the numerical value for the metal in subsection B of this section is multiplied by the WER to produce an instream concentration that will protect designated uses. This instream concentration shall be utilized in permitting decisions.

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189 2. The WER shall be assigned a value of 1.0 unless the applicant or permittee
190 demonstrates to the department's satisfaction in a permit proceeding that another value
191 is appropriate, or unless available data allow the department to compute a WER for the
192 receiving waters. The applicant or permittee is responsible for proposing and conducting
193 the study to develop a WER. The study may require multiple testing over several
194 seasons. The applicant or permittee shall obtain the department's Division of Scientific
195 Research or its successor approval of the study protocol and the final WER.

196 3. The Permit Regulation at 9VAC25-31-230 C requires that permit limits for metals be
197 expressed as total recoverable measurements. To that end, the study used to establish
198 the WER may be based on total recoverable measurements of the metals.

199 4. The Environmental Protection Agency views the WER in any particular case as a site-
200 specific criterion. Therefore, the department's Division of Scientific Research or its
201 successor shall submit the results of the study to the Environmental Protection Agency
202 for review and approval/disapproval within 30 days of the receipt of certification from the
203 state's Office of the Attorney General. Nonetheless, the WER is established in a permit
204 proceeding, shall be described in the public notice associated with the permit
205 proceeding, and applies only to the applicant or permittee in that proceeding. The
206 department's action to approve or disapprove a WER is a case decision, not an
207 amendment to the present regulation.

208 The decision to approve or disapprove a WER shall be subject to the public participation
209 requirements of the Permit Regulation, 9VAC25-31-260 et seq. A list of final WERs will
210 be maintained by the department's Division of Scientific Research or its successor.

211 5. A WER shall not be used for the freshwater and saltwater chronic mercury criteria or
212 the freshwater acute and chronic selenium criteria.

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213 9VAC25-260-170. Bacteria; other recreational waters.

214 A. The following bacteria criteria (~~colony-forming units (CFU) counts~~)/100 ml) shall apply to
215 protect primary contact recreational uses in surface waters, except waters identified in
216 subsection B of this section:

217 [In freshwater,]E.coli bacteria shall not exceed a [monthly] geometric mean of 126 [CFU
218 counts]/100 ml [in freshwater] [and no more than 10% of the samples in the assessment
219 period shall exceed a Statistical Threshold Value (STV) of 410 CFU/100 ml] [and shall
220 not have greater than a ten percent excursion frequency of a Statistical Threshold Value
221 (STV) of 410 counts/100 ml, both in an assessment period of up to 90-days].

222 [In transition and saltwater,]Enterococci bacteria shall not exceed a [monthly] geometric
223 mean of 35 [CFU counts]/100 ml [in transition and saltwater] [and no more than 10% of
224 the samples in the assessment period shall exceed a Statistical Threshold Value (STV)
225 of 130 CFU/100 ml] [and shall not have greater than a ten percent excursion frequency
226 of a Statistical Threshold Value (STV) of 130 counts/100 ml, both in an assessment
227 period of up to 90-days].

228 1. See 9VAC25-260-140 C for boundary delineations for freshwater, transition and
229 saltwater.

230 [2.]Geometric means shall be calculated using all data collected during any calendar
231 month with a minimum of four weekly samples. [The Virginia Department of Health
232 (VDH) shall make determinations regarding beach advisories or closures.]

233 3. If there are insufficient data to calculate monthly geometric means in freshwater, no
234 more than 10% of the total samples in the assessment period shall exceed 235 E.coli
235 CFU/100 ml.

236 4. If there are insufficient data to calculate monthly geometric means in transition and
237 saltwater, no more than 10% of the total samples in the assessment period shall exceed
238 enterococci 104 CFU/100 ml.

239 5. For beach advisories or closures, a single sample maximum of 235 E.coli CFU/100 ml
240 in freshwater and a single sample maximum of 104 enterococci CFU/100 ml in saltwater
241 and transition zones shall apply.

242
243 [2. In VPDES discharges to freshwater, bacteria in effluent requiring disinfection shall not
244 exceed a monthly geometric mean of E. coli bacteria of 126 counts/100ml. Alternative
245 performance standards may be established where an approved Long Term Control Plan
246 establishes an alternative level of disinfection for a combined sewer system.

247 In VPDES discharges to transition and saltwater, bacteria in effluent requiring
248 disinfection shall not exceed a monthly geometric mean of enterococci bacteria of 35
249 counts/100ml.]

250 [B. The following bacteria criteria per 100 ml (CFU/100 ml) of water shall apply:

251 E.coli bacteria shall not exceed a monthly geometric mean of 630 CFU/100 ml in
252 freshwater.

253 Enterococci bacteria shall not exceed a monthly geometric mean of 175 CFU/100 ml in
254 transition and saltwater.

255 1. See 9VAC25-260-140 C for boundary delineations for freshwater, transition and
256 saltwater.

257 2. Geometric means shall be calculated using all data collected during any calendar
258 month with a minimum of four weekly samples.

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- 259 3. If there is insufficient data to calculate monthly geometric means in freshwater, no
260 more than 10% of the total samples in the assessment period shall exceed 1173 E.coli
261 CFU/100 ml.
- 262 4. If there is insufficient data to calculate monthly geometric means in transition and
263 saltwater, no more than 10% of the total samples in the assessment period shall exceed
264 519 enterococci CFU/100 ml.
- 265 5. Where the existing water quality for bacteria is below the geometric mean criteria in a
266 water body designated for secondary contact in subdivision 6 of this subsection that
267 higher water quality will be maintained in accordance with 9VAC25-260-30 A 2.
- 268 6. Surface waters designated under this subsection are as follows:
- 269 a. (Reserved)
- 270 b. (Reserved)
- 271 c. (Reserved)]